JULY-AUGUST 1953

Communications—Electronics—Photography

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U. S. Marine Corps Electronics

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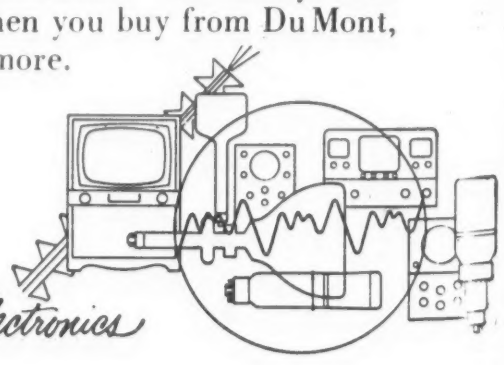

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SIGNAL

Communications-Electronics-Photography

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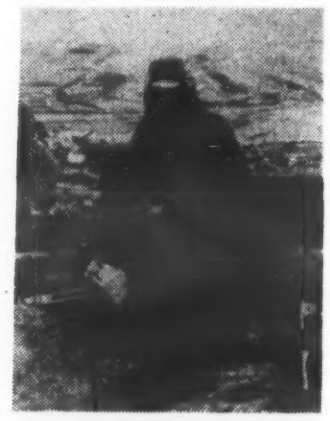
THE COVER

Major General Frank E. Lowe, USA, presidential representative in Korea, examines "flash range" instruments on the Marine front lines in Korea. Explaining the instrument is Marine Staff Sergeant Charles A. Kitching of Redlands, Calif. These instruments are some of many kinds of electronic equipment, the supply of which is explained in the article "Marine Corps Electronics" on page 10.



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. . . that over 30 years ago Crosley brought out the first popular-priced radio?

. . . that one of the first stations in the country ever to be granted a commercial license was Crosley's WLW, Cincinnati—"The Nation's Station"?

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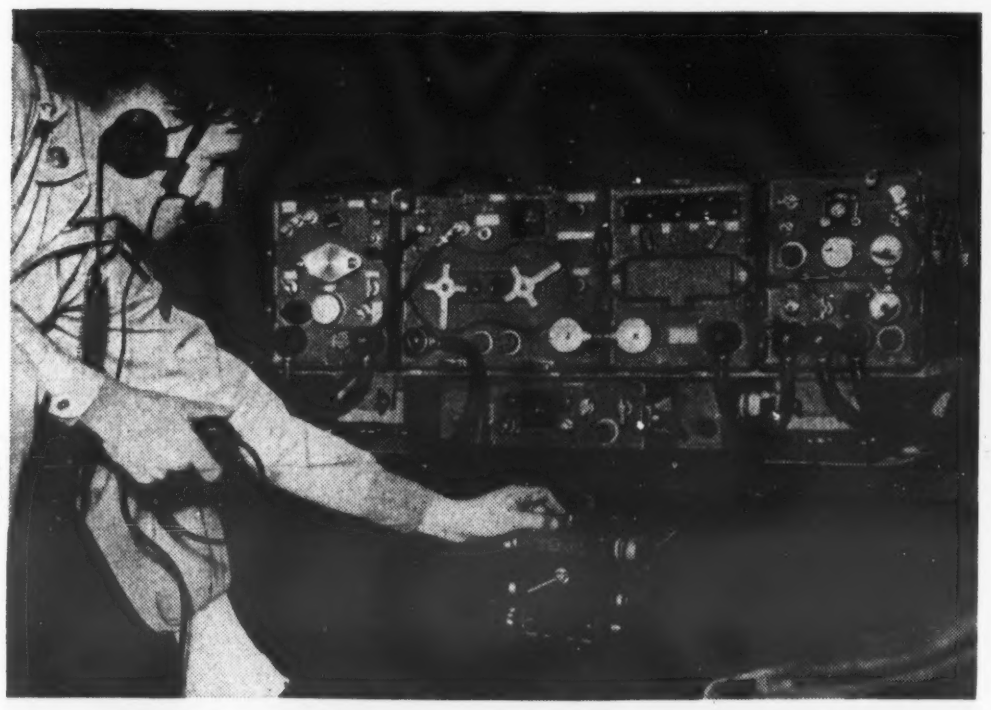
For the Signal Corps, Crosley, a Division of Avco Manufacturing Corporation, is producing the FM Transmitter-Receiver RT-68 as a part of the standardized Series AN/GRC-3/8 and the AM Communications System AN/GRC-9.

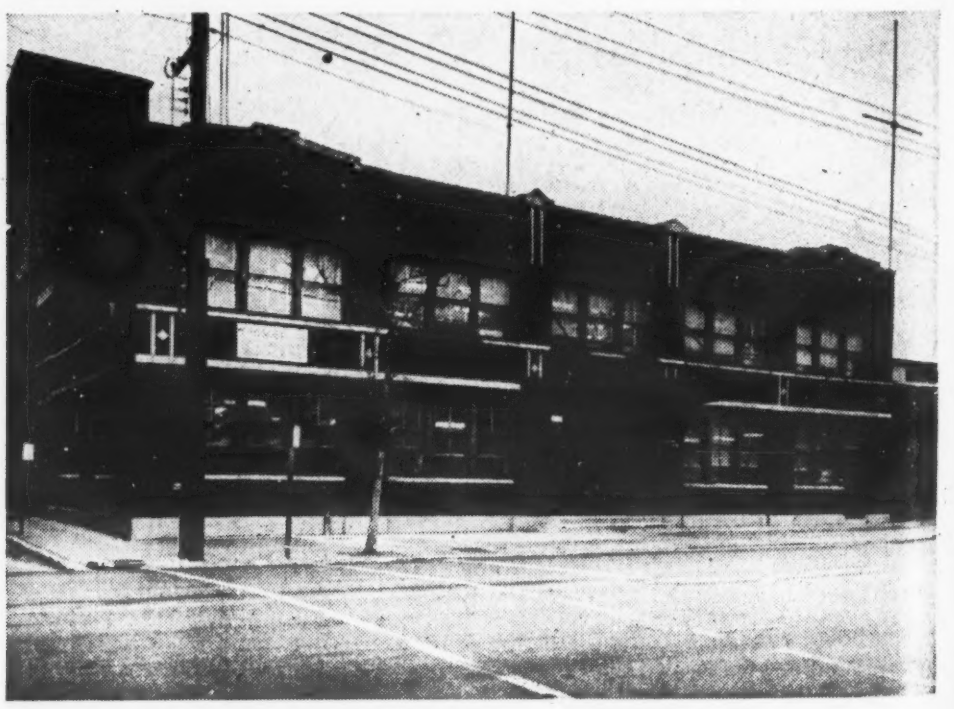
Crosley engineers are also developing new and advanced forms of Radio Communications Equipment. These include applications of transistors as well as sub-miniaturized components and the use of printed circuits.

Crosley today is one of the nation's largest manufacturers of electronics equipment for the Armed Forces.

Communications System AN/GRC-9, *made by Crosley for the Signal Corps, provides two-way AM radio communication between units in the field.*



Receiver-Transmitter RT-68, *being worked here in a typical vehicular installation, is Crosley-produced and forms an integral part of the FM Communications System used by the Signal Corps.*



Crosley's Cincinnati Plant No. 7 *is turning out highly classified electronics equipment for the Navy along with the RT-68 and AN/GRC-9 FM and AM Radio Systems for the Signal Corps.*

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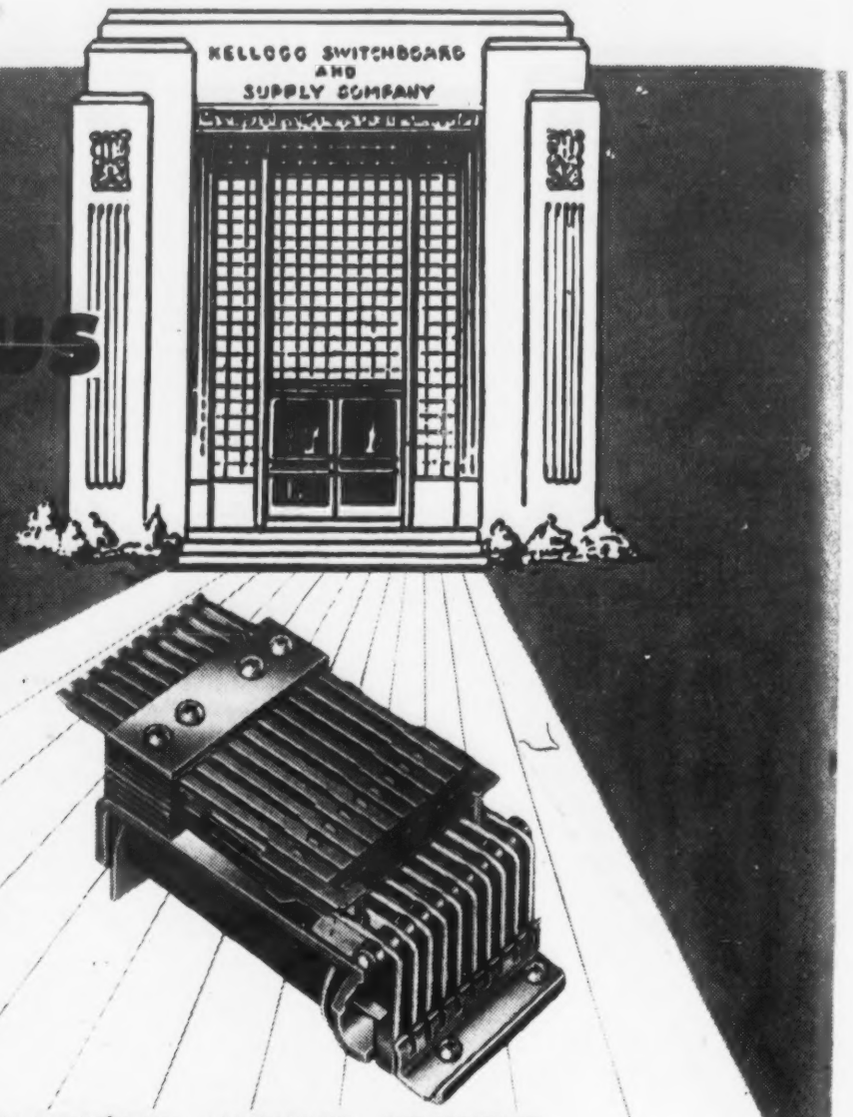

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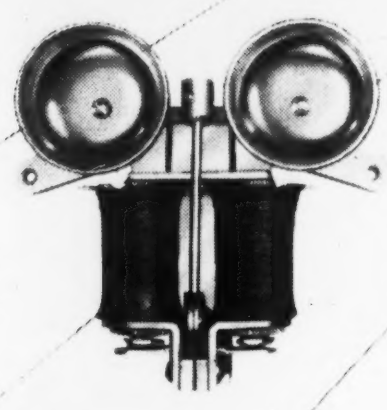

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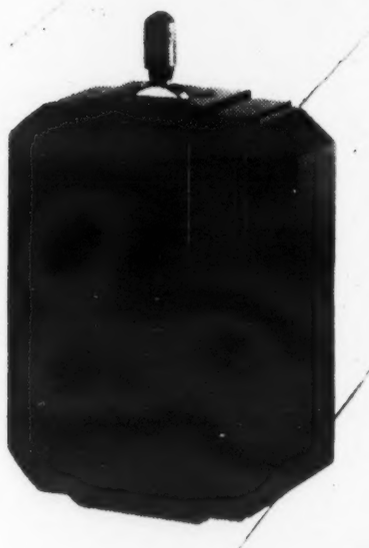

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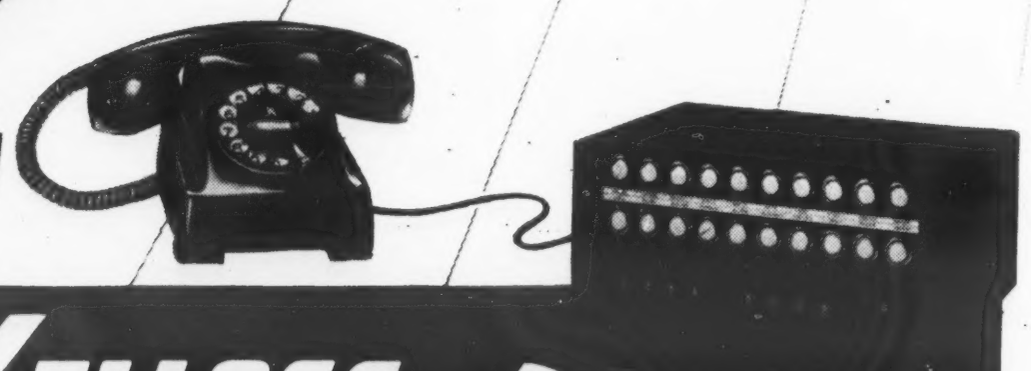

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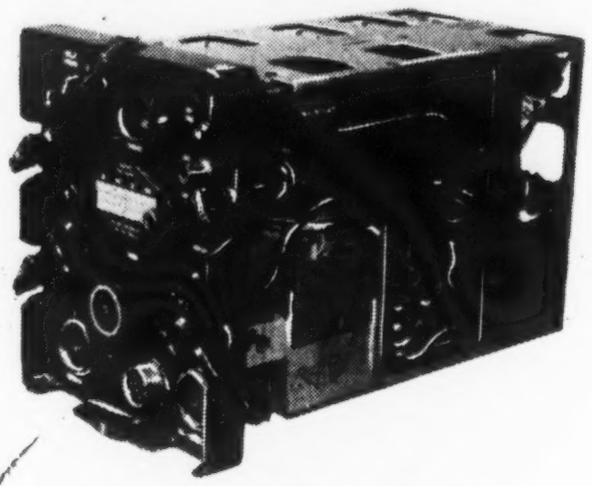

R-110 Radio-Receiver with some of its Lewyt-manufactured components.

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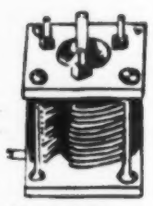

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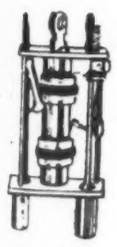

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And, here at Lewyt, we shrink costs through *integration!*

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By making our own components, we eliminate many "double profits"

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. . . *all reducing costs!*

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Lewyt has been in the Government Contracting business since 1914—not merely as a fill-in when the commercial pipe-lines dry up—but continuously through war and peace!

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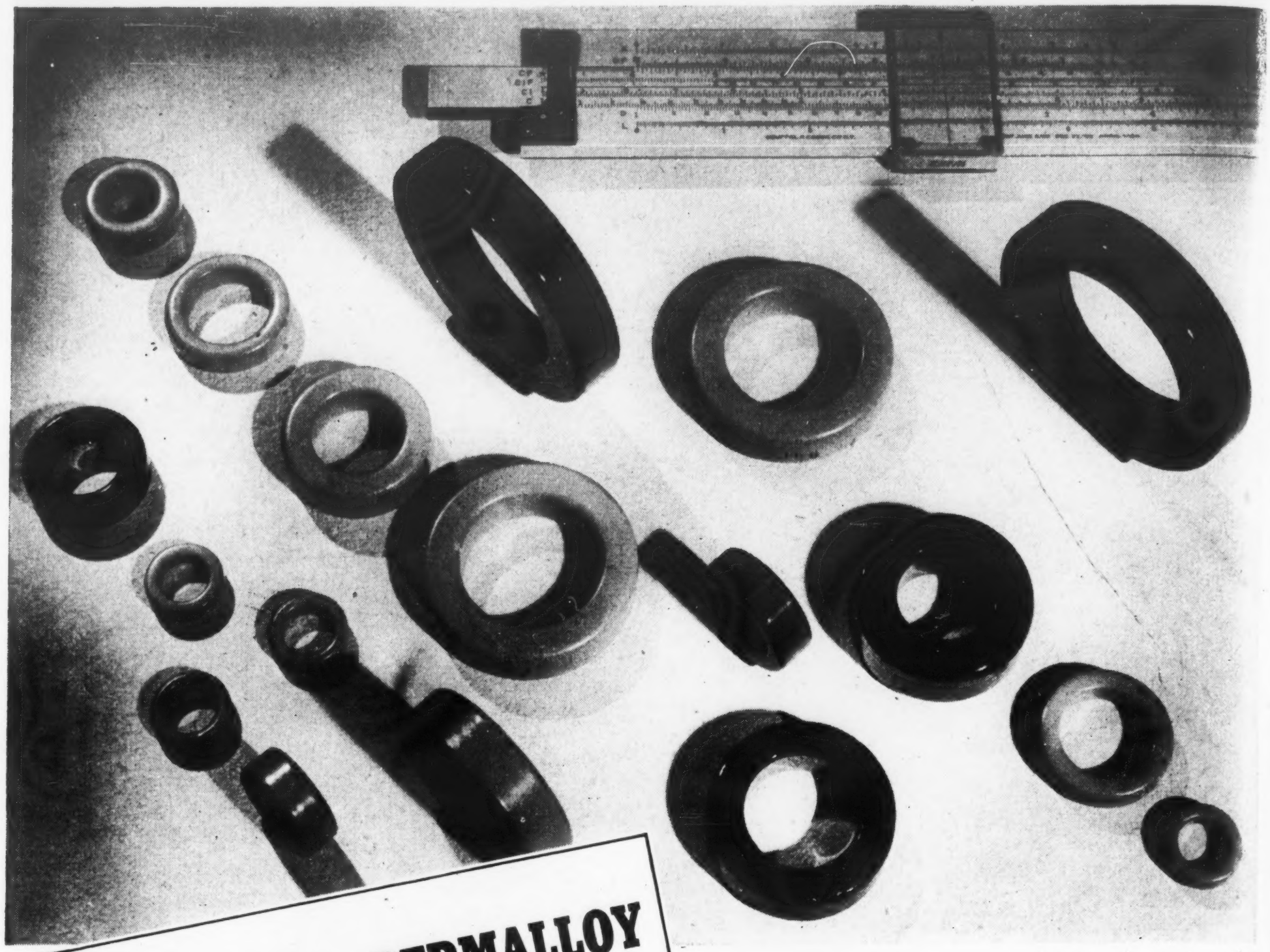

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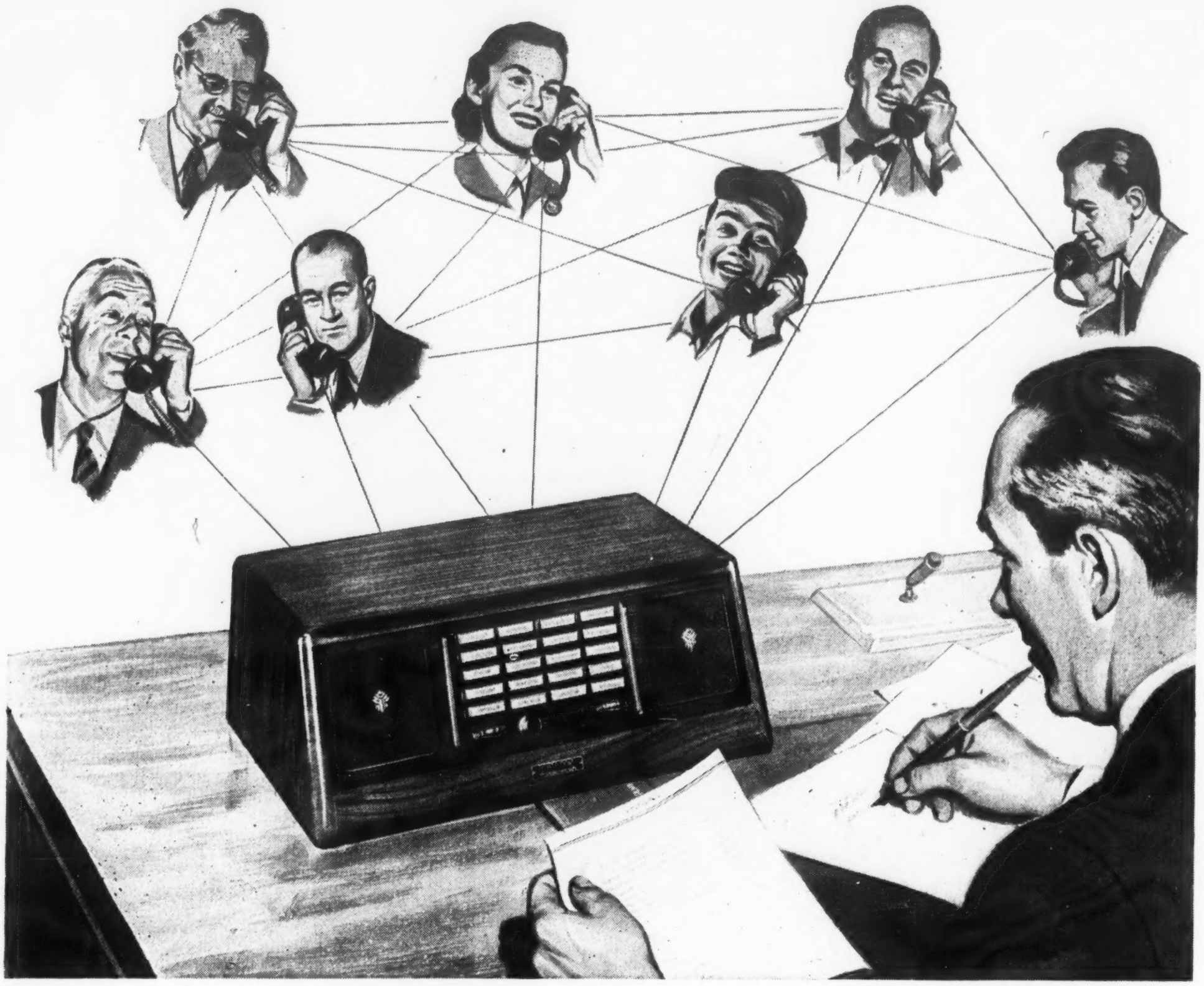

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It's automatic. It's separate from your regular switchboard. No operator is needed. You can hold private individual discussions or group conferences. You can connect to as many as 55 extensions in plant or office.

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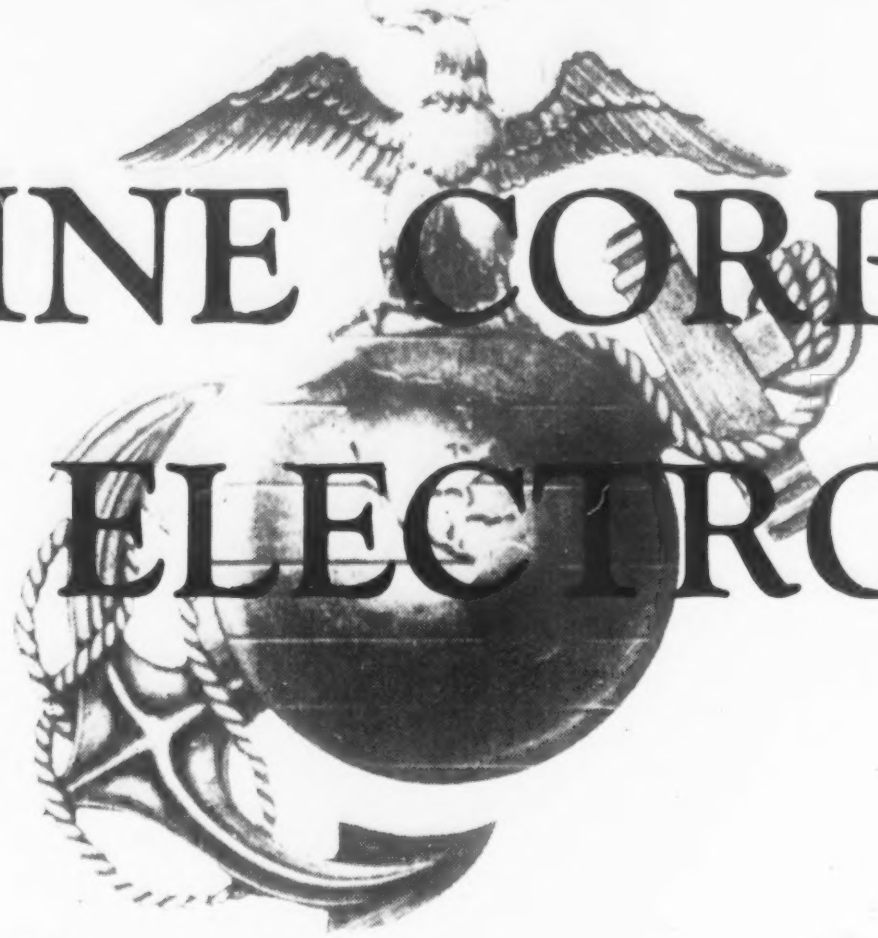
MARINE CORPS ELECTRONICS



by

Colonel Melvin G. Brown

U S M C

Head, Electronic Supply Section

ELECTRONICS IS THE NERVE SYSTEM of most modern weapons, and often it is the eye and brain as well. It is a modern Colossus which refuses to be contained within the narrow framework of any single field of endeavor. for having first cut its teeth on communications applications, we find it now flexing its muscles at the idea of intercontinental and even interplanetary missiles.

Because the organization of electronics supply within the United States Marine Corps is unique among the several services, Mr. George Ruehl, the Armed Forces Communications Association's representative, suggested that association members may be interested in reading of this organization; why it is so organized. where and how it operates, and what it does. Perhaps civilian partners of the "military-civilian partnership"—as the Association's past president. Mr. Frederick R. Lack, describes it—should also be interested in knowing that many of the dollars they think of as being Army, Navy, or Air Force are in fact the Marine Corps' and these other services are usually the latter's agents.

In order that the turbulent field of electronics be administratively tamed for relative ease of handling, the Marine Corps has confined it within certain "word boundaries." We understand electronics to be that branch of electrical science and technology which treats of the constitution and behavior of electrons as subject elements and utilization thereof for the realization of certain objective effects. As such, it is comparable to but distinct from electrostatics, electrokinetics, electrodynamics, electromagnetics, and other branches of electrical science. While in some respects communications is a corollary of electronics, in many others it is distinct, and this distinction is one factor which determined our present organization.

In the Marine Corps, when referring to organization, an electronic unit is defined as one having as its primary function the supply and maintenance of electronics equipment and communication equipment, or the operation of electronics equipment for purposes other than operational communications. Radar is an example of a type of electronics equipment which is normally used for purposes other than so-called operational communications.

Treating of communications, it is understood that this field embraces methods or means of conveying information from one person or place to another. Communications may consist of transmission by electrical, mechanical or other means, of maps, overlays, radiograms and other messages.

Again when referring to organization in the Marine Corps, a communication unit is defined as one having as its primary mission the installation, operation and maintenance of operational communications, including telephone, telegraph, wire, radio, radio relay, cryptographic, message center and message facilities. In only

TABLE I

Military or Other Agency Through Whom Purchased	*% of Total Funds Expended*
Signal Corps, Department of Army	61
Bureau of Ordnance, Department of Navy	14
Bureau of Ships, Department of Navy	11
Air Materiel Command, Department of the Air Force	8
Bureau of Aeronautics, Department of Navy	4
Commercial Suppliers	2

←

Contract field engineers work on Marine Corps equipment at the Charleston Naval Shipyard shops. These civilian engineers, on contract from the companies whose products they service, work to keep equipment in top condition.

one aspect, maintenance, does this blend into electronics.

With these distinctions in mind let us look at the organization which places in the artisan's hand the tools of his trade, the Marine Corps electronics supply system.

From the working point of view its head is in Marine Corps Headquarters at the Navy Department, Washington, D. C. At this fountain-head is the primary source of procurement and design specifications for production. From procurement comes production with its inspection, receiving with its inspection, then storage, packing and shipping. Finally there is installation, operation and maintenance. Up to the time of installation each step is the responsibility of the electronics supply system. From and including installation the steps may be under the supervision of other electronic or communication units serving with operational communications, ordnance, artillery, aviation, guided missiles and the like. That is, the last three steps are under the supervision of other units unless depot maintenance is required, in which case the necessary job is performed within the electronics supply system.

Thus we derive our term "functional," which is descriptive of Marine Corps electronics. It simply means that all electronic functions are kept within the electronics field.

At Headquarters, the electronics supply section is also charged with responsibility for quantitative, qualitative and delivery requirements and budgetary justification and control of funds. In justifying Marine Corps electronics' share of the Fiscal Year 1954 budget, the electronics supply section submitted through channels to the Bureau of the Budget, for analysis, proposed procurement through the Army's Engineers, Ordnance and Signal Corps, the Navy Materiel Bureaus of Aeronautics, Ordnance and Ships and the Air Materiel Command of the Air Force. It should be recognized that under present regulations any of these procurements could be placed directly with industry.

An example of coordinated effort between air and ground sectors is shown as Captain Patrick Dugan, USMCR, directs the movement of planes making a strike on enemy held hills.

From what has been said it may readily be understood that the answer to the question "Why is electronics in the Marine Corps organized as it is?" lies in the question: How could it be organized other than functionally without becoming a disjointed collection of little "empires?" It must procure, distribute and maintain electronic equipments and supplies for guided missile battalions, Marine Air control groups, 90 millimeter antiaircraft gun battalions, Marine divisions, 75 millimeter antiaircraft gun battalions, communication battalions. Air-Naval gunfire liaison companies. antiaircraft automatic weapons battalions, headquarters elements of Marine air wings, and so on. The order of naming of these type units is in the relative price of initial issue of electronic equipment to the particular type unit.

How procurement is spread dollarwise, may be shown by an analysis of the total Marine Corps electronic procurement, excluding airborne type. for the fiscal years 1950, 1951 and 1952. Such an analysis may also indicate a current trend in choice of basic systems, which the Marine Corps believes should be treated as entities, as opposed to what sometimes appears to be hit-or-miss approval of individual end items. The analysis appears in Table I.

The fact that 61 percent of the total funds expended were through the auspices of the Signal Corps may partially explain why Marine Corps electronic and communication equipment is stock numbered in the Signal Corps system. It may also partially explain why all maintenance parts pamphlets are modeled after the

Three signal men of the First Marine Division are shown as they bury five pairs of cable while installing communication lines to the First Marine Division Command Post at Hungnam.

SIG-8 as used by the Signal Corps, regardless of the agency through whom the parent equipment is purchased. The stock numbering unification step was actually taken early in 1945 under the authority of the Commandant of the Marine Corps and General Leroy Lutes, at that time Chief of Staff of the then Army Service Forces.

With that statement, we are beginning to see some ramifications of the Marine Corps electronic supply system.

Under the Quartermaster General the functions of Marine Corps electronics supply include procurement, warehousing, distribution, shipment, issue, and major, if not all, maintenance of all electronic material, the manufacture of specified articles, issuance of technical directives, representation in fiscal negotiations with the other three services and justification of budget estimates.

To accomplish those functions the electronics supply section translates allowances of equipment, authorized supply levels and consumption factors into requirements. It balances projected requirements against forecasted assets, draws up preferred production schedules based on any deficiencies brought to light and estimates the monies necessary to correct the deficiencies. This is done for both annual appropriation requests and quarterly expenditures.

Decisions as to how much electronic supplies and equipment to obtain and from or through whom to obtain them are made by the electronics supply section in the name of the Commandant. In regard to obtaining supplies, great reliance is placed on the procedures set up under military specification MIL-M-15772. That this specification for determining maintenance parts requirements must be workable is evinced by the apparent satisfaction on the part of suppliers.

One very important aspect of usable electronics is maintenance. Successful maintenance is always predicated on an adequate supply of requisite spare parts. When an initial equipment is first used maintenance parts should be on hand and available. To be on hand and available it is particularly necessary that parts peculiar to the equipment be purchased and delivered with that equipment. This is especially true if the article is to be but a "one shot" production job, a situation which prevails all too often in this progressive field.

Procurement includes obtaining personnel and services as well as supplies and equipment. It may be interesting to note, in this connection, that field engineers and engineering services are contracted for by the Marine Corps from sources such as Hazeltine, Philco and Raytheon. This provides the Corps with the latest industry has to offer in the way of technical knowledge of and techniques for design, maintenance, repair and operation. By having these contract engineers and services work with the Marine Corps' own it is hoped that design, procurement, adaption to use by the landing forces in amphibious operations, supply, and rebuilding of electronic material will be readily responsive to the needs of the Corps. Immediate and direct responsiveness is important. The importance may be understood when one recalls that by August, 1952, 95 percent of the items being produced had been put into production since the opening of hostilities in June, 1950.

Supply and rebuild, although stemming from Washington headquarters, is accomplished mostly by and at depots. The depots are presently located at Camp Lejeune, North Carolina; Camp Pendleton, California; Philadelphia; and San Francisco. Under a special arrangement an appreciable amount is carried on at the Charleston Naval Shipyard, South Carolina. More of the work is done by troop organizations and units deployed from Korea to the Mediterranean. It is these troop organizations and units who install, operate and maintain equipments, at least maintain them within their capabilities. Electronics serves wherever Marines serve, on the land, on the sea and in the air.

Thus far, there has been a discussion of why Marine electronics is so organized, what it does and generally where it operates. To best appreciate how it operates it is necessary that there be some knowledge of fundamental concepts.

Crewmen of Marine Rocket launchers set up rockets for firing. Seconds earlier, they had been flown to the firing site by helicopters from HMR-161. After the rockets are fired, the launchers are flown to another firing site in Korea.

Hanson Baldwin once said: "Wars are won on land, whether by the foot soldier or by the atomic bomb." He has also said that: "The Navy must be able to attack the land by amphibious assault, the landing of troops and supplies on neutral, friendly or enemy coasts, over beaches as well as through ports, by Marine helicopters as well as by landing craft."

In order that the Navy be able to attack the land by amphibious assault there must exist as a separate and distinct entity within the Department of the Navy, in the same manner as does the United States Navy, a corps of officers and men equipped

Above: Front view of a carrier jeep which was rigged by the First Signal Battalion, First Marine Division. Below: To insure effective teamwork as a result of reliable communications among all elements, a Communications platoon, Second Battalion, Fifth Marines, makes sure its gear is in top shape before going back into combat.

and drilled as much as land soldiers are. Such a corps is our United States Marines. The Marine Corps' status within the Department of the Navy is that of an Armed Service of the United States. This status is reflected in current matters, for example by Department of Defense Directive 4000.3 of November 17, 1952 when, in referring to the four services it uses the phrase "Army, Navy, Marine Corps and Air Force."

The Commandant of the Marine Corps is responsible directly to the Secretary of the Navy in material matters. It should be obvious then, that any other official or officer subordinate to the Secretary should not speak for the Commandant except in instances of specific delegation. This last refers to lateral positions, for the Commandant has and always will assume responsibility for the words and actions of his subordinates. Of such is the essence of command.

Understanding those basic attitudes it should be relatively simple to appreciate how Marine Corps electronics operates. It labors for the ultimate combat user, seeking to place the best, usable electronic munition at his disposal, prior to his need. It works to effectuate command, knowing that a poor plan well executed is better than the best of plans poorly performed.

But suppose that a piece of electronic equipment develops trouble up front. If the trouble cannot be remedied by the operator with the equipment spares at hand, the article is passed toward the rear in the supply system until it reaches an organization, unit, or shop having the repair part and which is capable of correcting the fault. In the meantime a usable end-item or end-product has been issued to the front-liner.

Reports of repair or maintenance parts used and "failure reports" on the material are transmitted rearward to either the Electronic Material and Catalog (EMAC) Section, Philadelphia, or the Electronics Supply Department, Washington, D. C. EMAC has authority to adjust maintenance parts procurement and supply. It effects the adjustment, reflecting issue history and failures, either through provisioning procedures on equipment contracts or separate purchase. EMAC is the Marine Corps supply-

(*Continued on page 78, col. 1*)

This photo, taken about 40 years ago, shows the interior of the first Hammarlund shop. At the extreme left is Lloyd Hammarlund, now president of the company. Oscar Hammarlund, the company founder, is seen in the extreme rear of the shop, and the man at the right is a friend who dropped in to do a repair job on his own shotgun.

the HAMMARLUND story

OVERLOOKING THE HUDSON RIVER on the west side of Manhattan in New York City are located the offices and factory of the Hammarlund Manufacturing Company, on four floors of the huge 460 W. 34th St. building, and with additional space in nearby structures.

This organization of 675 persons produces variable capacitors and communications receivers used all over the world, and for the past few years has been developing and manufacturing a line of standard data transmission, remote supervisory control, and selective signaling equipment.

Heading this organization is Lloyd A. Hammarlund who is president of the company and son of the founder, Oscar Hammarlund.

From its beginning this company's history has been a sensational series of "firsts"—the "first" midline capacitor, standard in receivers today; the "first" "MC" and "APC" type capacitors, built originally for the infant group of radio experimenters that existed in the early 20's; producers of the "first" superheterodyne type shortwave receiver with ham bands calibrated on the bandspread dial, and "first" designers and builders of a beat frequency oscillator with its dial calibrated in kilocycles. Literally dozens of innovations and advances have been incorporated in the Hammarlund communications receivers from the earliest models to the 1952 version of the famous "SP-600" which was designed to be the finest receiver of its type available anywhere.

The new complete line of remote control and signaling equipment now being introduced includes areas of development untouched previously in standard production equipment.

Lloyd A. Hammarlund, president of the Hammarlund Manufacturing Company, New York City.

Early Development

For many years before most of today's radio and electronic manufacturers even existed, every wireless enthusiast and dabbler in electricity knew of Hammarlund. During this period amateurs and experimenters have turned to the organization for many of their requirements. Based on two full generations of experience and know-how, the Hammarlund Company is today looking only to the future in its efforts to produce new and better products for the fabulous expanding electronics field.

Fanning back through the years of such an organization is a tremendous history of growth and advancement, much of it lost, having never been recorded. The focal points of that history which continue to live can only be told fully in terms of those persons who lived it.

The site of the Hammarlund Manufacturing Company of today, with its production line manufacturing and its bright, modern offices would seem unbelievable to Oscar Hammarlund in the early years after his founding of the company in 1910.

Twenty years before the founding, Elisha Gray, co-inventor of the telephone, put the finishing touches on a new development that was to astound

the world. The machine was the Telautograph, a device designed to electrically transmit writing by wire. It is still in use today.

Many problems were encountered in designing and building this unique instrument. After working out most of the details, Gray found that frequent failures and dulling of the stylus or pencil at the remote end handicapped the entire system.

Assisting Gray was a young man who in many ways is credited for the success of the Telautograph. A number of his own inventions were incorporated into the machine. This assistant, Oscar Hammarlund, received the assignment to engineer a means of overcoming the handicap of the troublesome stylus.

He solved the problem by developing a propelling type pencil. In doing so, he invented our present-day "automatic" pencil, although at the time he failed to realize the ultimate possibilities of his invention. It was one of the first of many important items that he eventually was to develop and see become standard products.

Oscar Hammarlund was born in 1861 in Stockholm, Sweden. Throughout the various schools he attended, he won the admiration of his fellow students as well as many high honors for his engineering ability.

After completing technical college, he went to work as special tool designer and inspector of electrical instruments in Stockholm for the L. M. Ericksen Company, a leading instrument manufacturer and originators of the French type telephone.

Shortly thereafter, he received an offer of a similar position with the Elgin Watch Company in the United States and accepted the opportunity to come to this country. He arrived in 1882.

Hammarlund Inventions

His outstanding engineering achievements at Elgin attracted the attention of Western Electric Company officials and in 1886 he joined that company as superintendent of their Chicago plant. Six years later he joined the Gray National Telautograph Company (now known as "Telautograph Corporation") then engaged in the development of the Telautograph. As designing engineer and plant superintendent, he spent many years with Elisha Gray, and was able to closely follow the early history of radio development.

Capacitor production begins with the giant power press where millions of plates are punched out at the rate of several hundred an hour.

So keen were Mr. Hammarlund's interests in the "wireless" that in 1910 he decided to organize a company for the purpose of developing his own ideas.

The Hammarlund Manufacturing Company's initial success is due solely to his painstaking research and struggle during those early days. It was not until 1919, when radio broadcasting first started, that Oscar Hammarlund had an opportunity to put to practical use the results of his many early experiments.

The company was originally located in a loft on Fulton Street in Manhattan. In order to continue its operations and maintain its handful of skilled persons, it built a seemingly weird assortment of products ranging from "Anti-window Rattlers," which were merely small metal pieces that slipped in between window frames and the window to hold it tight after the wood shrunk, to the "Bango," which was a protection device inserted in windows so that if it were disturbed during the night by an outsider, a blank cartridge was set off to awaken the householders. (Imagine the shock of the man who rising to close his window in the night forgot to disconnect his "Bango"!)

Other items manufactured in those very early days included twin liquor decanters, a finger-gauge for use by jewelers, metal measuring rulers, mechanical window displays, and metal watch cases.

The company also at one time manufactured Air Alarms for installation in ceilings. This apparatus was constructed of a metal bulb in which was installed a diaphragm. When this bulb became overheated, the diaphragm expanded and set off an alarm at a distant location, which, of course, was used for fire protection purposes.

Joseph Klein, who is today in charge of the model shop, tells that when he joined the company in 1914 at the Fulton Street shop, one of its more complex pieces of equipment, the Armagraph, was in manufacture. This phonograph-type piece of equipment, made up of a rotating disk in which notches were cut and over which glided a platinum tip contact, was used to train amateur radio operators in Morse code. As the disk rotated and the needle hit each one of the holes, it produced the sound of a dot or dash. Another item being built at this time was a centrifugal machine used by medical laboratories for urine analyses.

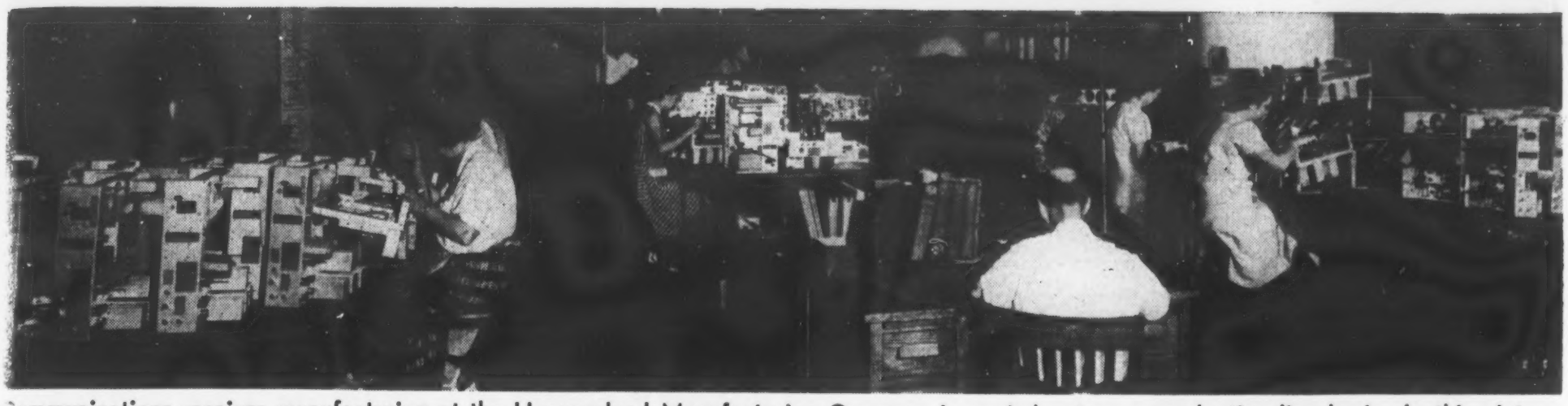
First Electronic Products

The first Hammarlund variable capacitor was developed in 1916, not as a product for a specific electronic application, but as a machined product for an experimenter who furnished the plans. Actually, the company executives had slight concept of its actual use.

In 1920 the company moved up to 18th Street where about 50 persons were employed.

At about this time Oscar Hammarlund developed a new automatic machine for making clips to go into the tops of Christmas decorations and expand inside to hold the clip on the individual decoration. Today, as a result of the machine, this type of

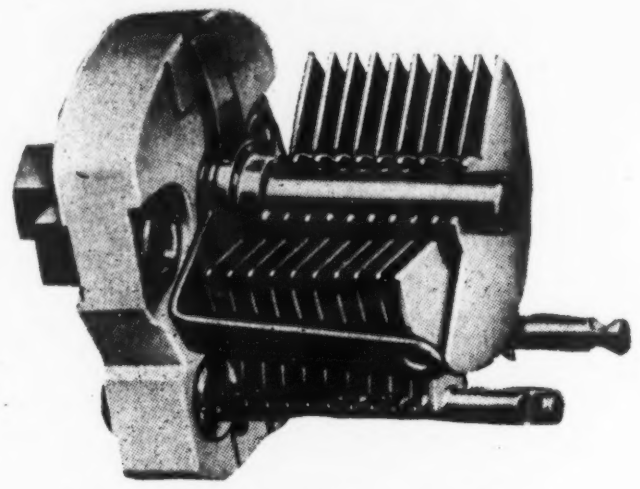
A section of die-storage room at Hammarlund Company plant shows a portion of the great number of costly precision-made dies required for the company's manufacturing operations.



Communications receiver manufacturing at the Hammarlund Manufacturing Company is carried out on a production line basis. In this picture the SP-600's are being built.

clips permits easier decorating of Christmas trees.

The company became most well-known in the 20's for the hundreds of thousands of Western Union call-boxes it manufactured. These small fixtures inhabited nearly every business office. When a company executive wanted to telegraph a message, someone would turn the crank on the call-box, which would send a specific signal to the nearest Western Union office. A boy would be sent over immediately to pick up the message.



This "APC" capacitor, originally designed and made by Hammarlund in 1925, is still being manufactured and used in precision electronic equipment.

There were also double-throw knife switches that were manufactured as well as "cordless table jacks" for telephone systems, all of which marked the beginning of the definite swing to electrical products.

First Radio Products

In about 1925 the company moved to 424 West Thirty-third Street, where the first Hammarlund-Roberts radio kits were built. These kits, designed for broadcast listening by experimenters, incorporated capacitors, coils, and other items manufactured in the plant.

This was generally considered one of the finest and most successful kit-type radio receiving sets of its time. Its circuit technique was ahead of nearly all ready-made receivers.

In the same year the famous Midline variable condenser, an innovation designed by Lloyd and Oscar Hammarlund, was developed as the only practical solution to the tuning problem, and is now standard in all home receivers.

By 1931 three outstanding broadcast receivers—the Hi-Q-29, Hi-Q-30, and Hi-Q-31 — had proved to be among the finest home constructed receivers on the market. Because of their excellent tonal quality, many are still in use today.

The Comet-Pro, the first commercial short wave superheterodyne, a Hammarlund pioneered product, was just undergoing final engineering touches in 1931.

By 1936 the Comet-Pro was in use by the thousands all over the world by commercial operators, in broadcast stations, and by leading amateurs. All the important exploring expeditions included it as part of their standard gear.

Early in 1936 the first "Super-Pro" was introduced after over four years of engineering.

Wartime Activities

Because Hammarlund had specialized in high precision capacitors for use in commercial and military equipment, nearly 90 per cent of this nation's electronic war equipment in 1941 was incorporating Hammarlund capacitors.

The bulk of the capacitors used in the early stages of the war continued to be turned out by this company until other manufacturers could learn Hammarlund techniques and get into production. The famous "APC," Hammarlund's original midline capacitor, was produced at the rate of one million a month by ten different manufacturers.

Thousands of Hammarlund communications receivers were used on all the battle fronts by the Army, Navy, and Air Corps during World War II. Many other military electronic products were designed and built in the company laboratories and factory, some of which more than ten years later are still in the "secret" category.

The Company Today

Three major lines of products are now on the market, being manufactured both for commercial and military use — communications receivers for use by the Army, Navy, Air Corps, commercial aviation, marine, amateur and other commercial groups; remote supervisory control and signaling equipment, which has been engineered and on the market since shortly after the end of World War II; and variable capacitors, the faithful old line.

Perhaps, most intriguing of the equipment is the remote supervisory, or Data Transmission, equipment.

Included are such items as a Duplex Signaling Unit for integration into any type of radio or microwave system requiring "on-off" switching, continuous indication of operating conditions, and automatic detection of wire line or power source failures. Up to 36 separate functions can be controlled over a single circuit by multiple use of these units.

Also available now are Dual Transmitter and Dual Receiver Units for use where the same type of operation is required, but where only one-way transmissions are necessary.

The company's "Super-Pro 600" receiver, which became well known

(*Continued on page* 80, *col.* 1)

The "SP-600-JX" professional communications receiver is used by all branches of the armed forces here and abroad and for commercial operations.

Future Signal Corps

CAMERA LENSES

by Ed Sutherland
Signal Corps Engineering Laboratories
Ft. Monmouth, N. J.

UNTIL RECENTLY, THE DEPARTMENT OF THE ARMY had a difficult time procuring high-quality lenses. Lenses were purchased on the basis of a manufacturer, his type designation, followed by the phrase: "Or equal"; for example: "Lens, 2-inch focal length, f/1.9, or equal." The "or equal" phrase was necessary since by omitting it, the Government would be compelled to deal only with one of the major camera manufacturing companies or one of its dealers. Although such a practice would ensure getting high-quality lenses, it would be unfair to other reputable lens manufacturers. Moreover, the Government would not enjoy the advantages of price competition.

For many years the "or equal" clause proved to be quite a headache. Solicitation of bids for lenses generally revealed alternate manufacturers to be lower in price. For the price stated, these concerns agreed to furnish lenses "equal" in quality to that made by the major manufacturer. Unfortunately this was rarely found to be the case. Since the Government was not in possession of manufacturers' lens specifications, it was difficult to ascertain whether the "equal" was comparable to the original. Samples of the "equal" were often compared with the original by test and sometimes found acceptable only to find at a later date that the production lenses fell short on quality. Obviously, the Government inspector at the plant had no standard upon which to gauge the quality.

After many years of putting up with such a condition, it was decided that something had to be done. In the Spring of 1952, the Signal Corps Engineering Laboratories (SCEL) embarked upon a program to prepare Government specifications on lenses to ensure that:

a. Prospective bidders would be aware of the exact requirements for lenses desired by the Department of the Army.

b. The Army would obtain high-quality lenses reflecting the most recent design and development.

c. The Government inspector would have criteria upon which to base his acceptance.

d. The serviceman in the field would have a high-quality lens to complement his camera.

A review of the stock catalog revealed hundreds of different lenses utilized by the Signal Corps. To prepare procurement data on all of these listed would have been a tremendous task. It was therefore decided to perform two more functions prior to tackling the specification assignment. First, a complete investigation of all stock lenses was made to determine which might be obsolete or outmoded. Surprising as it may seem, the result of the investigation caused a reduction of the original list by 20%. Secondly, it was believed that the list could be reduced much further by some sort of standardization. Engineers of the various lens industries were consulted and the prospect of a standard lens series received enthusiastic support.

Lenses for 16mm and 35mm motion picture cameras have been recently standardized and action is currently being taken at SCEL to complete the program for still cameras. When completed, such standardization is expected to reduce the original lens list by an additional 30%.

The standard focal lengths of 35mm camera lenses are 25mm, 35mm, 50mm, 75mm, 100mm, 152mm, and 254mm. For the 16mm camera lenses, they are 13mm, 25mm, 63mm, and 127mm.

Standardization of the comparative quality between one lens and its complement is also being realized. For example, professional cinematographers often speak of the need for matched lenses on their studio-type motion picture camera turret. They contend that when switching from one lens to another, there should be no visible difference in image quality, i.e., exposure, definition, contrast, distortion and so forth. In order to achieve this goal, the lenses, until recently, had to be either custom-made or hand-worked after procurement to adapt them to the motion picture camera. Since this was a costly proposition, such a practice prevailed only in motionpicture studios. Incidentally, the TV industry has recently realized the importance of having matched lenses on their cameras in order that no perceptible change in picture-quality would be noticed when switching cameras or lenses.

Fortunately, there is a more practical and economical method of securing matched lenses than modifying existing lenses. By arriving at one high-quality performance standard for all lenses, matched lenses can be obtained directly from production lines. Identical requirements for lenses of all standard focal lengths have been established through coordination with industry. For example, if the required lens characteristics of a 1-inch lens are the same as a 2-inch lens, the lenses will be matched.

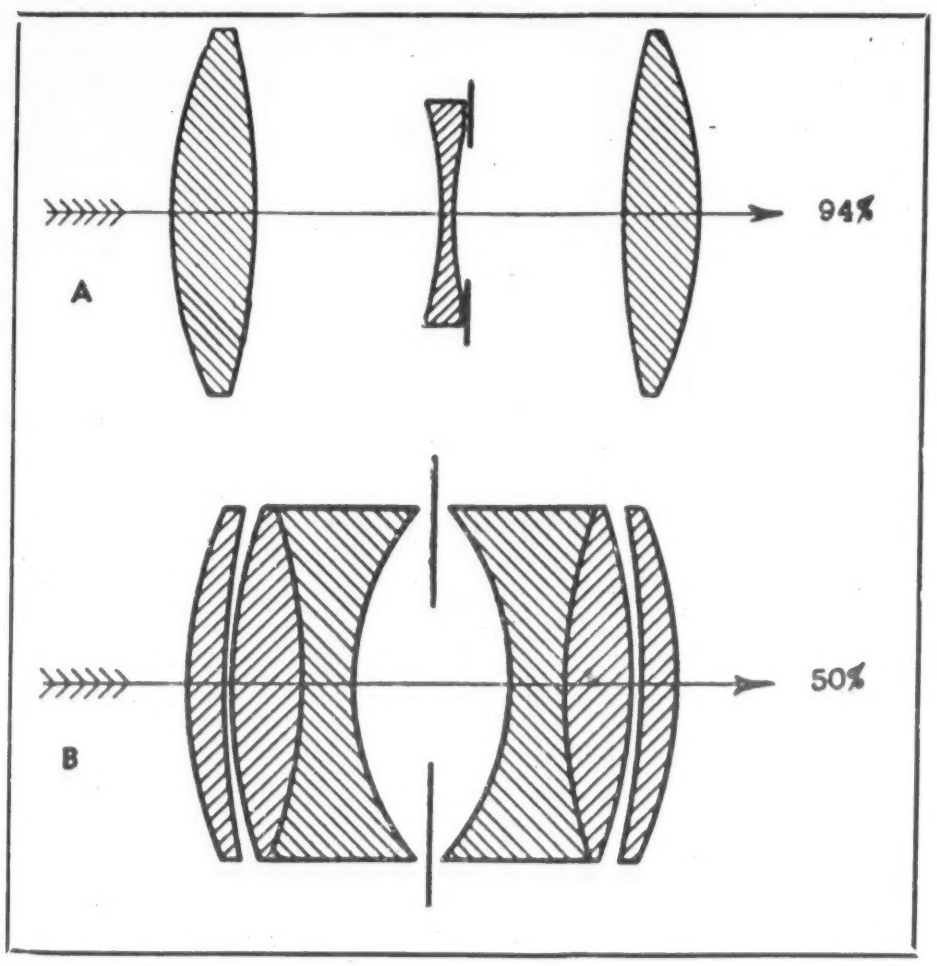
It was no easy job to arrive at a uniform set of lens characteristics applicable to all standard focal length lenses. Numerous compromises had to be made. For instance, it is possible to design a lens having exceptionally high resolution over its entire field. However, as the lens designer aims for higher resolution, he finds that the lens contrast becomes progressively poorer. Therefore, some compromise must be made between resolution and contrast.

Other lens compromises are maximum aperture opening versus lens resolution. This is one lens characteristic that fools the general public when they go to purchase a lens for their camera. A lens manufacturer may advertise: "A new 1-inch, *f/1.5* lens at a ridiculously low price." First of all, if the lens price is relatively low, the chances are it doesn't contain much glass, and in order to obtain the wide lens opening, tremendous sacrifices had to be made in resolution. In all probability the resolution isn't much better than that obtainable from the end of a beer bottle. On the other hand, if the same lens is advertised at a relatively high price, the lens must consist of many and larger optical elements to render resolution commensurate with the price. But, here again the consumer is being short-changed and doesn't know it. The contrast of this lens (at wide-open aperture) may not compare to a slower lens. Furthermore, the f/1.5 lens isn't as fast as he thinks it is.

This brings us to the matter of f/stops versus T stops. Ordinarily, if we own an f/1.5 lens and our neighbor an f/1.9 lens, we believe our lens to be faster than his. That is, we assume that more light will be transmitted through the f/1.5 lens than the f/1.9. After all, we paid good money for that fast lens and when it comes to extremely poor lighting conditions, we should get fairly good exposures whereas our neighbor shouldn't.

To our dismay, we find that our neighbor's exposure is better—but why? The answer is that f/stops don't give a true indication of the light transmission through the lens. Since the f/stops are normally based on the geometrical values of the focal length and aperture diameters, the f/stops of a lens of a given type will vary from lens to lens as the focal length and aperture diameter vary within their tolerances. For example, in Figure 1, "A" is a 3-element coated lens, which will transmit 94% of the light, whereas the 6-element, uncoated lens "B," with more lens surfaces and elements, will transmit only 50%. Thus, *at the same f/stop* these lenses differ from each other in light transmission by nearly two to one.

Figure 1. Aperture diameters and focal lengths identical, therefore f/stops are the same. Note differences in light transmission.



It is therefore obvious that when using f/stops it is impossible to obtain absolute uniformity of exposures when changing from one lens to another. But equipped with a set of T stop lenses, a photographer can place three lenses in his turret, set them all at one T value, and shooting the same scene with each lens, be certain of absolute consistency of exposure.

T stops represent honest measurement of light actually transmitted by the lens at various settings. Since the light at every T stop is actually measured electronically, T2 or T8 on any lens will admit the same amount of light as T2 or T8 on any other lens, regardless of the differences in focal lengths, construction, or maximum apertures.

The T stop system takes into account light losses inherent in all lenses; for example:

a. Loss by reflection caused by glass-to-air lens surfaces.

b. Loss by absorption, since glass absorbs some light depending upon its thickness and type of glass employed.

c. Additional losses (paragraphs "a" and "b") as the number of optical elements are increased.

d. Losses due to lens coatings (absorption).

e. Losses due to manufacturer's tolerances.

Analyzing the two systems, f/stops have and will continue to suffice for lenses on still cameras and single-lens motion picture cameras. For this application, slight differences in exposure can be compensated for in printing and processing. Moreover, the exposure differences are rarely perceivable since the latitude of black-and-white film absorbs some of the exposure variations of f/stop lenses—that's why we've managed to get along nicely with f/stops for so many years.

However, T Stops are suggested for one definite application—that is, where more than one lens would be used on a motion picture camera and exposure accuracy is required for good results or with color film.

In printing and processing color film, it is difficult and expensive to compensate for exposure variations. Furthermore, if color prints are not made from negatives (as in the case of a reversal process), it is impossible to compensate for incorrect exposure during processing. Therefore, T stop lenses on turrets should be more important to amateur or semi-professional cinematographers where the color film they take from their camera is returned to them as a print.

On projectors, T stop lenses are also desirable and are being considered for Army adoption. Recently a large number of f/1.6 projection lenses were tested at the Signal Corps Engineering Laboratories. Some of these lenses produced a drop in screen illumination up to 30%. It had been presumed that all of the f/1.6 lenses transmitted approximately the same amount of light. The test results proved conclusively the invalidity of the f/stop system.

All of the factors discussed in this article had to be given serious consideration by industrial and Government engineers prior to arriving at Government specifications for high-quality lenses. These people deserve a great deal of credit for their cooperation in rectifying a lens situation which has proven costly to the Government for many years.

Electronic Equipment

by Captain F. R. Furth, USN
Assistant Chief of Electronics, BuShips

ELECTRONIC EQUIPMENT is no longer a novelty to the Armed Forces, but an absolute military necessity. Human lives are dependent upon the proper functioning of electronic parts, electronic circuits, and electro-mechanical appliances. We have become so reliant upon electronic brains in the conduct of modern warfare that the outcome of an engagement with enemy forces, and even total war, could well be determined by their performances!

While many of the marvelous electronic devices which have been created for the Armed Forces since the outbreak of World War II have been designed to satisfy operational requirements stated by the users, the research scientists and design engineers have had a profound influence on the creation of a military market for electronic products. The laboratory workers, in their race to maintain technical supremacy for this country, have envisioned and sold to the Services ideas for the creation of electronic devices to replace man's sensory organs and brain. Indeed, they have left no stones unturned to provide devices which ultimately could result in true "push-button" warfare. Many of the functions are desirable and can be performed more rapidly and accurately by these devices than by man, but only when they operate at their rated performances. Most of these electronic devices, however, are so complex and difficult to adjust, that when placed in the hands of the average enlisted operators and maintenance men they seldom are operated at, or even close to, their required performances. All too frequently they are inoperative! Like the creator of Frankenstein, we have produced devices which, in the hands of the operating forces are so unreliable that they could lead to our ultimate destruction!

I can assure you that the situation has become so critical that we must divert a sizable portion of our engineering efforts from the creation of newer wonders, to the "reliabilizing" of current types. Our operating forces must be provided with equipment that will function as intended at all times when needed. The Armed Forces are dedicated to this program of simplifying and "reliabilizing" equipment.

That achievement of our goal is an extremely difficult undertaking, should be apparent to each of you. Because of the magnitude of the problem and its importance to everyone—we can't afford to risk American lives on uncertain weapons—it is the patriotic duty of every electronic scien ist, engineer and manufacturer to give serious thought to the ways in which he may contribute to the solution of this problem.

There are three main approaches to the production of reliable electronic equipment for the military services. First, improve the characteristics of electronic tubes and parts; second, improve circuit designs; and third, simplify the equipment. All are closely inter-related and fortunately for us, are being worked upon simultaneously. We feel that we have made considerable progress, but we are not so foolish as to believe that we have the "situation well in hand." On the contrary, we who are closely associated with the problem realize that we have only driven the entering wedge and that a much greater overall effort is required.

In order to acquaint you with the work in progress, I will describe briefly, several of the programs and their results to date. Since I am more familiar with the Navy's contribution, I must make references to our work; but I can assure you that our brother Services are engaged in similar undertakings, and many programs are conducted on a joint basis.

Electron tubes have been considered to be the greatest single source of trouble in electronic equipment. Investigation to date has disclosed that tubes have been and continue to be a weak spot in equipment performance, but not to the extent for which they have been blamed. Tubes in many cases acted as fuses when other parts have been at fault. The ease of replacing tubes is too frequently used as a means for preventive maintenance rather than first determining the real causes for failures. To deter-

This article is based on a talk recently delivered by Captain Furth to the Philadelphia Chapter of the AFCA. Captain Furth is an active AFCA member, and a director of the Washington Chapter.

Reliability—

a COOPERATIVE task

mine failure rates of tubes, programs of controlled data-gathering under competent technical supervision have been established. These programs supply statistics not only on failures but also include engineering evaluations to ascertain the causes for failures.

Through its field personnel collecting tube-data at eight Army, Navy and Air Force bases, our contractor maintains surveillance over large populations of tubes operating under actual field conditions. All tube failures are collected, together with any information obtainable concerning the sockets and equipments in which they failed, and the causes for failure. Analysis of this information provides general indications of the main areas of trouble —the tube types with the highest failure rates, the sockets and equipment-types where tube troubles are most serious, and the most common types of defects. Specially designed controlled tests are then conducted to obtain more precise information on tube life to failure, and to compare the performance of JAN tubes with their improved counterparts. Approximately 40,000 tubes are now under surveillance in these controlled tests.

Our contractor now estimates tentatively that the return of a third of the tubes is attributable to basic tube weaknesses capable of producing catastrophic equipment failures. The remaining failures are attributed, in proportions not yet determined, to maintenance and operating procedures, environmental conditions, and misapplications. These three factors are difficult to appraise, but because of their obvious importance to reliability, must be thoroughly investigated and understood.

Development of more reliable tubes is progressing by a major cooperative effort with the other branches of the Armed Services and with the tube-manufacturing industry. Changes in electron-tube procurement specifications include additional tests and inspections to insure against tube failures, to define more clearly the life operating-characteristics of the tubes, and to provide the circuit-design engineers with more information on the performance capabilities and the limitations of tubes.

Realizing that any tubes obtained for military use will be no better than the care and precision employed in their manufacture, the Services have enlisted the support of the tube-manufacturing industry to improve the methods of assembling and processing production-type tubes. Outstanding examples of this are the premium lines of subminiature and miniature tubes which have been used extensively by the Services and for several years have been on the Armed Services Electron Tube Preferred List.

This production refinement-effort is dynamic and results in continual improvements in tube quality. Contracts have been placed with the electron-tube manufacturing industry for modifications of design, and for instituting refined production techniques to improve the quality of basic commercial-type tubes. These tubes, now made in limited initial production, incorporate all the known techniques presently available for the manufacture of very high-quality tubes. They often are referred to as U. S. Navy Reliable Tubes, but in the future probably will be known as Military Controlled Tubes. Laboratory tests are providing evidence that these Military Controlled Tubes are showing a significant increase in reliability over the standard JAN prototypes. Although the improvement is definite, the degree of increased reliability has not been accurately ascertained.

Because the reliability of electron tubes is affected in a major way by the care and attention given by the operators who assemble the tube parts into a completed structure, the manufacture of tubes with fewer or no manual operations would aid in minimizing or even eliminating the element of human error. With this in mind, the Navy sponsored a project for the design and development of tube structures in which assembly will be accomplished by automatic, or semi-automatic, means. This work has progressed to the point where tube designs have been established, and evaluations are being made of the various construction techniques employed in these designs.

The approach to the solution of the tube-application problem has been to employ a group of tube-application engineers from industry to investigate all the major electronic equipment, including guided missiles. This work has resulted in many changes in circuitry and application of tube types, as well as packaging changes to provide a better operating environment.

The Services have in progress many research and developmental projects for the investigation and advancement of improved electronic parts and materials. As a part of this program, a military contract was awarded to a large industrial laboratory for conducting analyses of electronic-parts failures on a controlled basis similar to the surveillance of electron tubes. This project was established to obtain valid and realistic information to delineate the contributing factors leading to failures of elec-

tronic parts. Under the contract, field engineers make detailed reports of the suspected causes for parts failures. The faulty parts and reports are forwarded to the laboratory where a group of specialists examine and test the parts and analyze the reports. Analyses of these failure data have made it possible to initiate remedial actions, such as improvements in design and substitution of better or different parts for specific applications. These data also are used to guide the research and development programs on parts and materials.

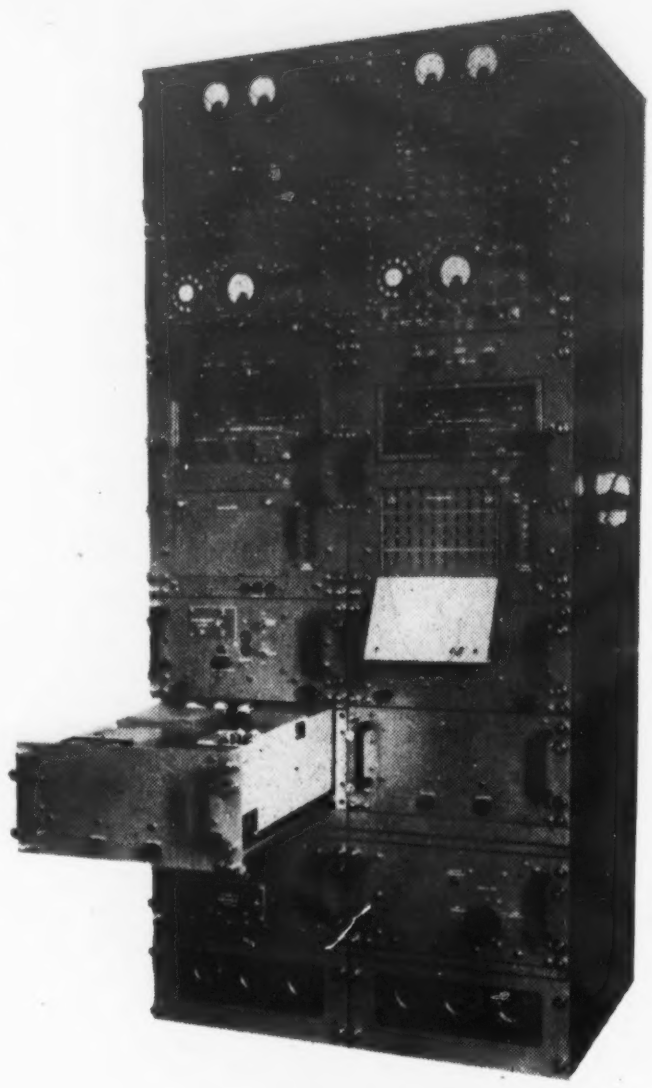
To date, 812 failed parts and their associated field reports have been studied. These parts fall into about 14 different categories. Resistors show the greatest number of failures, followed by capacitors, transformers and inductors, switches and r.f. connectors, electrical indicating instruments and relays in the order listed. The breakdown of attributable causes for failures of parts shows that the major sources of trouble are as shown at the bottom of this column.

Five general quarterly reports and three hundred forty-three specific reports covering the findings, together with recommendations to improve the reliability of specific individual parts, have been transmitted to the Bureau of Ships. Ten letters have also been written to the Bureau carrying recommendations for improving certain classes of parts, or recommending the replacement with improved designs. Greater use of protective measures was also recommended, as well as certain design changes to permit easier replacement of vulnerable parts which cannot be protected when other parts, such as tubes, fail. The results of these analyses are transmitted to the manufacturers of the parts and to the circuit-design engineers. This method of very close surveillance and failure analysis on a controlled sampling basis has established itself as an excellent means of correlating failure data with the design of more reliable equipment.

Also in the field of electronic parts and tubes, plans are being made for the development of "reliability handbooks on good workmanship" as well as on "electronic parts selection and application." When these publications are printed they will be distributed to all our contractors.

Equipment of simplified design facilitates adjustment and maintenance. The Bureau of Ships' general specifications for electronic equipment require design for accessibility and serviceability, and encourage the use of unitized and replaceable sub-assemblies where marked advantage in maintenance results. The specifications also require that test points be built into the equipment for rapid fault isolation, and to permit quick checks on performance.

The use of "unitized" or modular construction techniques is being extended to as many lines of equipment as possible. The Bureau of Ships' newest radio receivers, for example, are being designed in families of equipment. The receivers are designed to a common chassis, power supply, and audio system. Coverage of the different frequency channels requires only different I. F. and R. F. sections. Similar design techniques will be extended to include radio transmitters, radar, and sonar, where feasible.



AN/URT-3

In the past four years considerable work has been directed on the design of packaged sub-assemblies, but efforts have been made only recently to standardize these packages. A project now has been initiated to correct this deficiency by wider-spread use of circuits of known dependability. The ultimate objective is for standard package sub-assemblies to be made universally adaptable to all electronic systems. These sub-assemblies will be designed to make use of the simplest circuitry possible to provide the maximum heat transfer, to insure ideal mechanical arrangement, to facilitate trouble shooting and maintenance, and to permit maximum interchangeability between types of equipment. As a by-product supply support is greatly enhanced by the reduction of the number of different items required in maintenance stocks.

A research and development contract for the redesign of a standard search radar was recently completed and evaluated. The laboratory model retained the general characteristics of the standard design but was re-packaged to make use of "unitization" techniques and built-in dynamic test facilities. In comparing this modified radar with the standard radar, it was found that the average operator could monitor the laboratory receiver to within 3 db of optimum, whereas degradation in performance between approximately 10 to 20 db on land targets could not be recognized on the standard radar! The evaluation report also showed that the time required for fault location and maintenance was decreased by a factor of 10. These tests were so conclusive that, in advance of completing studies on standardized sub-assemblies or unit packages, the Bureau of Ships' general specifications for radar equipment now require built-in dynamic test facilities.

It now appears that semi-conductors, dielectrics and magnetic materials will play tremendous roles in the improved reliability of electronic equipment. While it is still too early to predict the ultimate outcome resulting from the use of these materials, the Services have a large number of very active projects to evaluate and devise means for the incorporation of these materials into electronic-equipment designs where reliability will be improved.

The transistor, in addition to its widely publicized size and power savings, offers improved reliability and added advantages over electron tubes, in those cases where they may be used. Its inherently simple, rugged construction and the absence of a "cathode," result in long life and great mechanical strength. The transistor is not the panacea for all of the electron tube ills, but in those applications where it can replace tubes, it should provide added equipment reliability.

Another approach for replacing electron tubes in certain appropriate applications has become possible by the

	% of components examined
1. Inherently inadequate design	22
2. Manufacturing defects	16
3. Operations	12
4. Burn outs (due to failure of other components, chiefly tubes)	12
5. Mishandling	7
6. Miscellaneous other causes	31

recent work in the field of saturated magnetics. The newly developed theory on saturated magnetic-core devices, which incidentally discarded the concepts of the past fifty years, makes possible the construction of magnetic amplifiers with amplification factors up to 10,000. Also the response time has been reduced significantly. These amplifiers can be made to serve many needs now requiring vacuum tube amplifiers. They can be made cheaper and lighter for a comparable power and assure a minimum life of 10,000 hours. The application of saturated core-magnetics to pulsing equipment also looks very favorable.

The dielectric amplifier has an amplifying element the size of a pinhead, is made of a hard and rugged ceramic material and requires protection only from impact and flexing stress. It, like the transistor, dissipates little heat and should be a valuable asset to the reliability program. Although an audio-frequency dielectric amplifier, used with a record-player pickup, has recently been demonstrated to the Navy, the device is still very much in the laboratory stage.

I have described some of the work already in progress to produce more reliable electronic parts and tubes and the efforts to improve circuitry. Now I would like to touch upon the Bureau of Ships' approach to the problem of simplifying its equipment. This program can be divided into two parts: namely, the projects initiated by the Bureau, and the projects conceived by our contractors and then transmitted to the Bureau for engineering evaluation.

The Navy is reviewing the military characteristics for the various types of electronic equipment with the view of eliminating all but the essential functional requirements necessary to permit the equipment to perform its primary mission. The elimination of desirable, but not essential functional requirements, results in less complex equipment which is easier to produce and to maintain—and thus, is made more reliable. While this study has been in progress only a short time and will be a continuing operation, the results have been quite fruitful.

For example, an operational need for providing all combatant ships for shore radio stations with automatic quick-shift transmitters was expressed by the Chief of Naval Operations. A transmitter was designed which incorporated all of the desired characteristics, including the presetting of any 10 channels within the frequency range 300 to 26,000 kc, with provisions for channel selection over the entire range in steps of 10 cycles. The complexity of this transmitter should be obvious. It became apparent that only those ships and stations with very large maintenance forces could be expected to keep such a complex device on the air. Accordingly, and at a time when a sizable production was just starting, the contract was modified to provide for a simplified version to be introduced into the production line (on a not-to-delay production basis) when the total reviewed requirements for the automatic type will be satisfied. In the conversion, the following have been eliminated to date:

1. 35 electron tubes, sockets and associated parts
2. 60 relays
3. 80 switches
4. 1 cabinet
5. 6 drawers

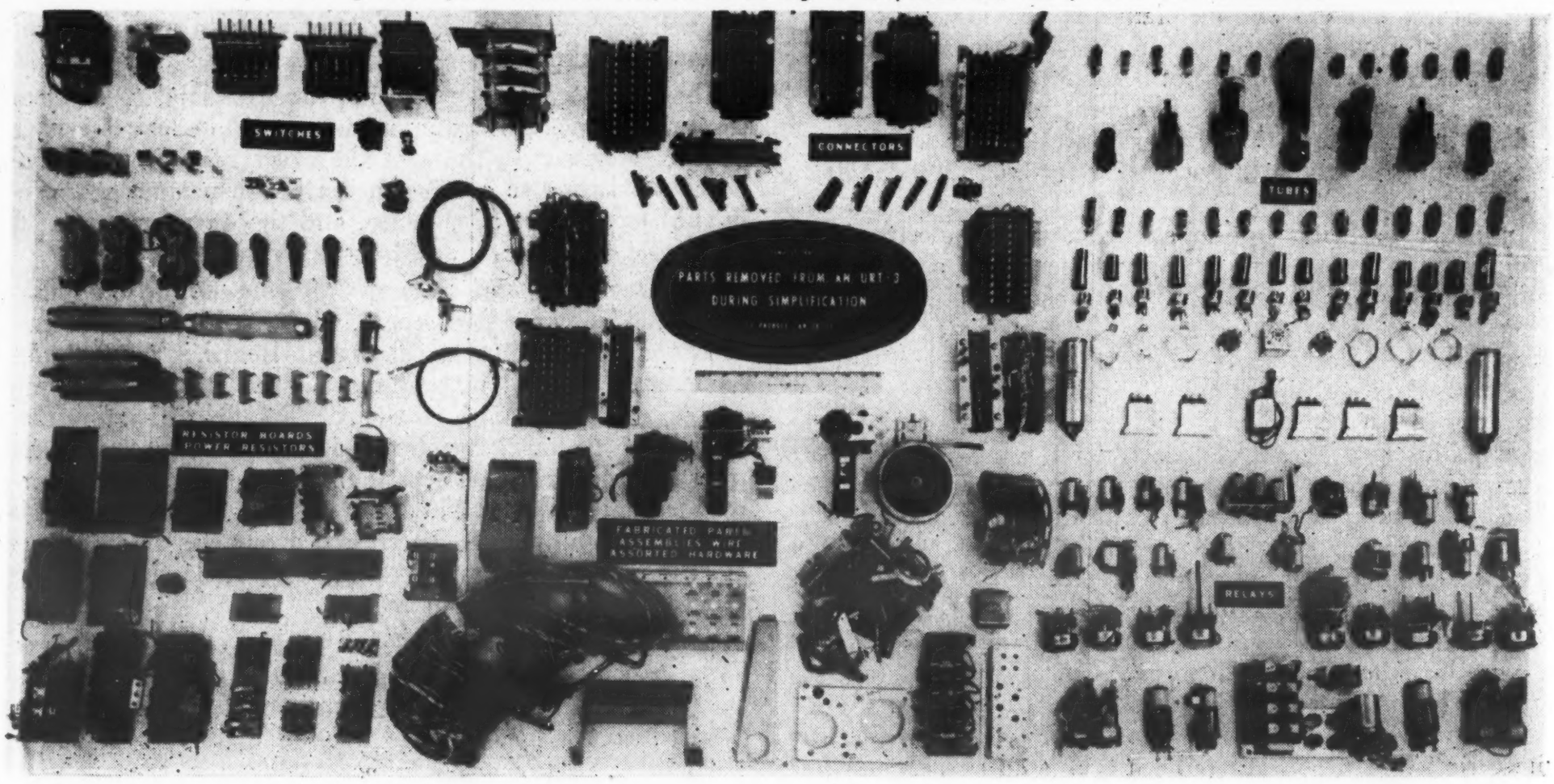
Eight test cables, which were separate in the original design, have been made an integral part of the equipment. The weight saved is 168 lbs. It is estimated that the "down time" for the simplified transmitter, as compared with the original, will be reduced by about 80%—a real improvement in reliability!

In the field of sonar, it was found that by modifying the military characteristics for an equipment, 60 mixer stages and an oscillator could be eliminated. These changes also eliminated cross-talk between channels and provided greater stability. During the course of these alterations the engineers also found that the three-phase synchro system in the PPI unit could be changed to a two-phase deflection circuit using resolvers, and thereby eliminate 14 of the original 22 adjustments.

A standard search radar is being modified in the interest of simplicity of operation. In order to make this simplification, a number of changes are being made as follows:

1. The elevation feature of the antenna reflector is being deleted. This modification eliminates the elevation actuator, the slip rings, a rotary waveguide section, and a number of electronic parts.
2. The azimuth synchro system and the true bearing system is being converted from a single speed and

By removing these parts from the AN/URT-3 during its simplification, 168 pounds were eliminated.



THE FOURTEEN POINTS FOR DESIGNERS

Study the Equipment Requirements

1. Before selecting the components, determine all circuit requirements and conditions, noting environmental and operational hazards—such as temperature, vibration, dust, fumes, and the electrical hazards—such as over-and-under voltage of the power sources and frequency variations of the power system.
2. Determine the required characteristics of each component, including all limiting factors established by RTMA Standards or by the component's manufacturers.
3. Select components that qualify under accepted standards, or with known capabilities wherever possible.
4. Specify parts whose characteristics fulfill all circuit requirements, noting their limitations.
5. Check with an approved source of supply, or with the manufacturer, for each specific part before final decision if any doubt exists as to its performance capabilities with anticipated operating conditions.

Operate All Components Within Their Capabilities

6. Use the regular derating factors listed in RTMA Standards or in JAN-MIL SPECIFICATIONS for temperature effects, current and voltage ratings, especially in case of resistors and capacitors.
7. Compensate for any known limitations in a particular component in the end equipment design.
8. Apply suitable safety factors to compensate for any variable conditions which may be encountered.
9. Protect equipment by fusing, metering, etc., to prevent damage by unexpected operating conditions.

Plan Optimum Layout and Design

10. Position all components so total temperature in component and in circuit does not exceed maximum safe operating temperature. Heat radiated from surrounding parts should also be considered.
11. Arrange components so that they are easily accessible for testing and maintenance operations.
12. Provide adequate ventilation. Where necessary add blower to keep components within safe ratings.
13. Add supplementary insulation wherever necessary, especially when unusual operating hazards are found.

Make Complete Tests

14. Check circuit functioning with random selections of tubes. Determine if shifts in tube characteristics or normal aging of other items is likely to affect operation seriously during the desired equipment life.

(This chart was prepared by the Radio-Television Manufacturers Association—Engineering Department—with the assistance of the Directors of the Armed Services Electro Standards Agency (ASESA) and of engineers of industry.)

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36 speed system to a single speed system. This also results in the elimination of a number of electronic parts.

3. The off-centering feature of the azimuth-range indicator is being deleted, which likewise results in the elimination of a number of electronic parts.
4. The front panel controls on the azimuth-range indicator are being rearranged and reduced in number. The indicator changes probably constitute the major changes in the equipment, and are in the interests of simplicity of operation. The operator now has only 10 controls to worry about, instead of the original 22.

The cost of the simplified radar is roughly 60% of the original design

Also in the radar field, the Bureau of Ships recently issued an invitation for bids on a simplified equipment for use by small ships and large landing craft. The Bureau's specifications covered performance only and requested that bidders outline plans for providing the required performance with the simplest and most reliable design, as the award would not be determined upon price alone. The response to this proposal was encouraging, and we are confident that the successful bidder will produce equipment which the operating forces will welcome with open arms.

In order to bring to the attention of the electronic-equipment manufacturers the great need for simplicity and reliability, the Bureau of Ships transmitted its Project Simplification letter of 6 June 1952. This letter solicits proposals from contractors which will result in less complex and more easily maintained equipment. Suggestions are desired at any time, including the period during a production run. These proposals, if approved after engineering evaluation, are accepted either for the construction of several models for service testing or if applicable to an existing contract, as a modification of that contract for introduction on a not-to-delay production basis.

As a result of this letter, several contractors have already submitted proposals, one of which cited plans for a simplified antenna multicoupler of improved performance. This multicoupler is smaller in size and approximately one-half the weight and cost of the item now being produced. This proposal has been evaluated and accepted, and the Navy is procuring a limited quantity of the simplified versions for service test purposes.

A proposed simplified radar repeater forwarded by another contractor is now being evaluated. This unit would result in a reduction of tube complement from 40 tubes for the simplest repeater now in production to 30 tubes.

Earlier, I mentioned the simplification of an automatic transmitter which is now in process. Subsequent to the starting of the redesign, one of the subcontractors for producing the new version discussed plans to provide the Navy with a far less complex transmitter than the model now in its final stages of development. His proposed transmitter would provide all the essential functional requirements of voice, telegraph, facsimile and teletype transmissions and meet the present performance specifications. The tube complement would be reduced from 92 tubes of 17 different types to 32 tubes of 5 types, and the transmitter will be capable of remaining on the air at reduced performance, with only 8 tubes in operation. It is planned to commence development as soon as funds can be made available.

That the need for greatly improved reliability of electronic equipment is acute and not overstated by me is, I believe, attested by the fact that two new groups have been established to cope with the problem: one group is in the Department of Defense, and the other group is in the Radio and Television Manufacturers Association.

The Department of Defense Advisory Group on Reliability of Electronic Equipment, while within the structure of the Research and Development Board, also includes members from the Joint Chiefs of Staff Electronics Committee, and the Munitions Board. The field of interest of this group includes the monitoring and stimulation of interest in reliability matters, and the submittal of recommended measures which will result in more dependable electronic equipment. The RTMA group has as objectives the following for improving reliability of electronic equipment (tubes, parts, systems):

1. The finding of ways and means of collecting and making use of valid information available to the various agencies of the Government and private industry;

(*Continued on page* 78, *col.* 1)

28th DIVISION RADIO SCHOOL

Sergeant Joseph Yorgason instructs Privates John Orosco and Carrol Mountain, students at the 28th Division Radio School, on the finer points of the AN/GRC-7.

GOEPPINGEN, GERMANY—Not long after the 28th Division landed in Germany in late 1951, the communications officers throughout the division discovered that with rotation quotas taking their cut of the assigned key personnel, trained radio operators were almost devoid in the 28th.

Because replacement troops with this special training were not sufficient, and quotas for specialist schools in Europe were too small, the Division Signal staff decided to take the responsibility of training their own men.

Since the inception of the 28th Division Radio School, 157 men have graduated as trained radio code operators with a minimum speed proficiency rating of 13 words per minute each. Several of the graduates have crowded close to the 20 word per minute mark. In addition to the "C-W Operators," 27 men have left the school as radio telephone operators.

An eleven week course is conducted to train the men in just about every field of signal communication. Of these, the most exacting phase of training is the International Morse Code work. Fifty percent of the total classroom time is spent at the code tables with the incessant dits and dahs ringing in the pupils' ears.

Not long after they have begun to study the International Morse Code, students can be heard in various parts of the Goeppingen Sub-Post conversing with the dit-dit dah-dah method of communication. Eleven weeks is not a long time to learn such a complicated course, and the students, anxious to get their code work down pat, take every opportunity to practice. A test given after the fifth week of schooling determines if a man is able to comprehend code suitable to pass the course.

Two classes are run through the school at the same time. One class of 40 men utilize the code tables during the morning hours while the other group takes instruction in the other classrooms. After the noon meal, the two classes switch places and equipment.

Six trained instructors, supervised by the School Commandant, WOJG John B. Kelly, teach the 20 different communication subjects to the two classes. All forms of AM and FM voice and code communications are covered by the course including how to operate and maintain six different army radios.

Several verbal commendations have been given to the Division Signal Officer, Lt. Col. Guy M. Blencoe, for the excellent records compiled by graduates of the course. Capt. John Rossborough, who was at that time 28th Division Artillery Communications Officer, was instrumental in inaugurating the radio school. Working with Colonel Blencoe and the Assistant DSO, Capt. Robert C. Doctor, he set up the school as it stands today. M/Sgt. Archie Brown is the school's first sergeant.

Because the men are only at the school on temporary duty, passes are something that come around only on week-ends. All of the students will agree, however, that there is no time for passes while trying to digest the material given in the classes. Most of the men will be found in their off-duty hours either practicing their code or studying their classwork.

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Practice makes perfect. Members of the eleven week course shown here are: (l. to r.) Pvt. Carrol Henfon, using the AN/PRC-10; Cpl. Charles West; Pvt. Donald Sullivan, working an AN/PRC-6; and Pfc. Wilson Akin.

★ 5 ★ Star Program

The RCA Government Service Division has drawn heavily upon its extensive and diversified commercial and industrial experience to provide the seasoned complement of technical personnel required for military activities.

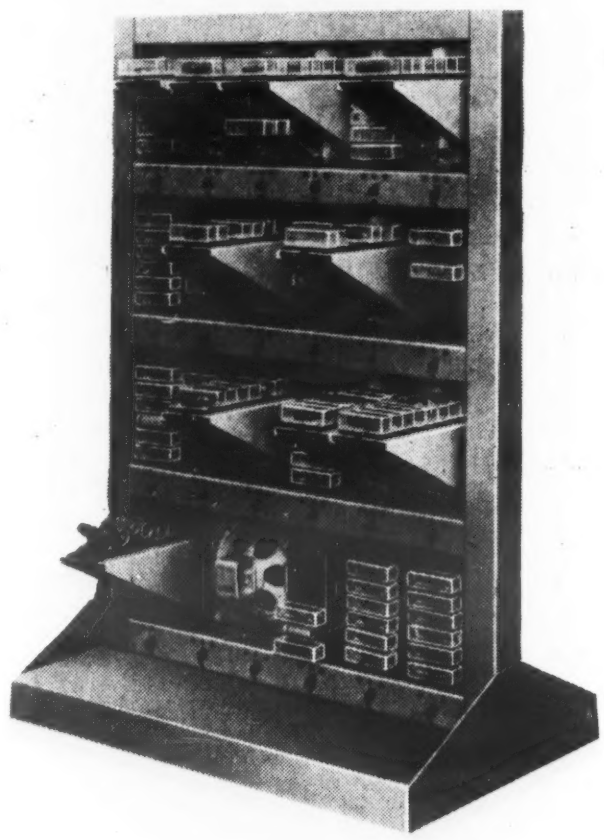
As the Armed Forces acquire electronic equipment from America's laboratories and production lines, the Government Service Division of the RCA Service Company will provide engineers to put this equipment to work. Their electronics know-how stems from the same labs and factories which produced much of the equipment—it's all in the RCA family.

Throughout the United States and in far corners of the globe, wherever our soldiers, sailors and airmen are stationed, RCA field engineers are serving military electronics, helping to keep communications humming, lining up gun sights and fire control, teaching guided-missile maintenance, instrument-landing systems, electronic altimeters. They handle more than 400 different types of electronic equipment, of all makes and design.

The RCA Government Service Division has drawn heavily upon its extensive and diversified commercial and industrial experience to provide the seasoned complement of technical personnel required for military activities. Top man of the Government Service Division is RCA Service Company vice-president, Pinckney B. Reed, who reports to company president E. C. Cahill. "Pincky" Reed is always on the move. His flying inspection tours take him to most parts of the world, from air bases in the frozen wastes of Alaska to the forward areas in Korea.

Although the Government Service Division is only a little over two years old. RCA has served the Armed Forces in the field since before World War II, when the Army and Navy suddenly discovered that they were short on qualified technicians to install and maintain the new complex electronic equipment being delivered in increasing volume.

Students learn by experience and practice with this electronic training device developed by the RCA Service Company.



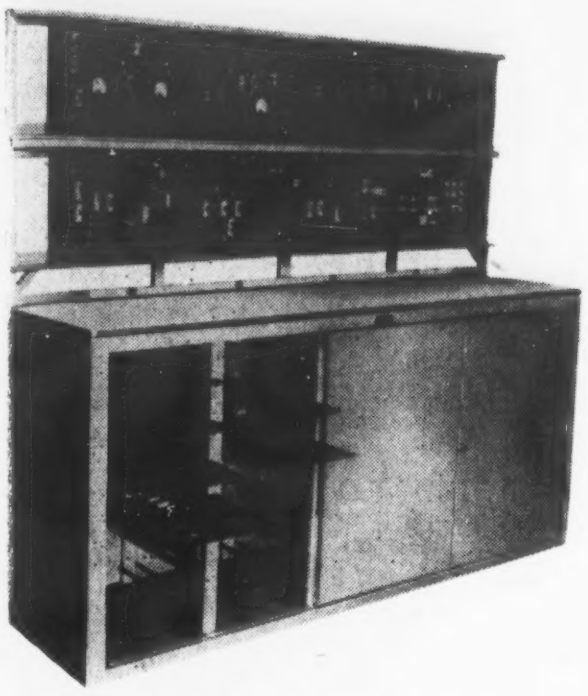
After the war, the core of this skilled group was kept intact. When hostilities flared in Korea, there were about 50 people still assigned to government activities at the RCA Service Company. Today, many hundreds of engineers and technicians are on the payroll of the Government Service Division.

Flexible System

After months of consulting with top Army, Navy and Air Force officers, Reed felt that defense needs in electronics could be broken down into five categories. He and his staff developed an amazingly flexible system called the *FIVE-STAR PROGRAM*. The five categories are:

Field Engineering—An ever expanding global force of field engineers to assist and train military people in installation, operation and service of any type and make of electronic equipment used by any branch of the Armed Forces. This service—including testing and evaluation—is available also to manufacturers and producers of any type of electronic product designed for use by the Military.

Technical Publications—Writing, rewriting, editing and publishing—on a contract basis—technical orders, manuals and instruction books, all types of training manuals or engineering reports in the military electronics field, covering such subjects as installation, opera-



This RCA electronics training demonstrator is used by instructors to expedite study of electronics by graphic presentations.

tion, maintenance, parts cataloging, and performance specifications.

Training devices—Included here are a wide variety of film strips and slides, wall charts, blown-up schematics, posters, as well as RCA Dynamic Electronics Trainers. These training devices also are available to schools, colleges, industry and other organizations teaching electronics fundamentals.

Training Programs—Selected instructors are provided to supplement and assist Armed Forces training centers in training enlisted and officer personnel. Special programs are prepared, and, if necessary, special schools set up and run by the company. Short-term or spot assignments are included. Factory training programs on all RCA-produced equipment are prepared.

Special Projects—RCA facilities and engineers are available for establishing or operating such systems as quality-control laboratories, guided-missile ranges, and naval-systems planning. RCA's own facilities are also available for large-scale repair, modification and calibration of electronics equipment of many kinds.

The heart of the entire operation is the company's field engineers. A typical RCA field engineer has three years in college, four years in industry and three years in military service. Many are graduate engineers. All are picked for reliability, experience, knowledge and leadership. They must be experienced in field engineering, systems planning, installation, supervision, operation, evaluation, servicing, and on-the-job training.

Field Engineer Commendations

In commending RCA field engineer David Rennie during World War II, Captain John Taylor, USN, then commander of Destroyer Squadron Six, highlighted the importance of initiative. "I have noticed," he wrote, "that the usefulness of civilian technicians on independent duty of this sort depends greatly on the initiative of the individual concerned."

RCA field engineers are with all branches of the U. S. Armed Forces and their allies, in all fields of electronics. With the Airways & Air Communications Service, they help to establish global communications.

Up in the North Atlantic, attached to AACS, Engineer John Heffernan, on his own, turned up a simple loop antenna, in conjunction with a pulse detector. Though he was told "it wouldn't work," he persisted in trying to find a way to reduce noise in this difficult communication area and was successful. His development saved the Air Force substantial sums by making unnecessary elaborate antenna construction and the purchase of real estate for antenna sites. To show its appreciation for Heffernan's work, RCA last year gave him the RCA Victor Award of Merit, the company's highest honor for salaried employes.

Another field engineer who won the company's Award of Merit is Morris Patneaude, an early volunteer for duty in Korea. Patneaude carried a carbine on the job and helped to keep open communications during that first terrible winter.

Reed himself was honored with the RCA Victor Award of Merit for "his remarkable success in welding together the global force of field engineers assisting the Armed Forces in servicing of electronics equipment."

With the Air Defense Command, RCA engineers are helping to organize a radar defense ring for North America. They are with the Tactical Air Command in support of ground and air activities, and with the Signal Corps, both here and overseas, setting up radar and communications-network facilities.

Throughout the World

They are with the Navy on the sea and in the air. Field engineers are in Europe, working with the U. S. and its allies, in England, Denmark, Holland, France, Germany, Portugal, Italy, Greece, the Near East, Africa.

In this country, they are busy on guided missiles for the Air Force and Army Ordnance, helping to set up ranges for testing short and long-range missiles.

Many engineers have been sub-contracted to other companies to assist in their electronic field problems, such as Boeing, Douglas, Bell Laboratories, Gibbs & Cox Ship Contractors, as well as RCA Victor, which makes radar and other electronic gear for the military.

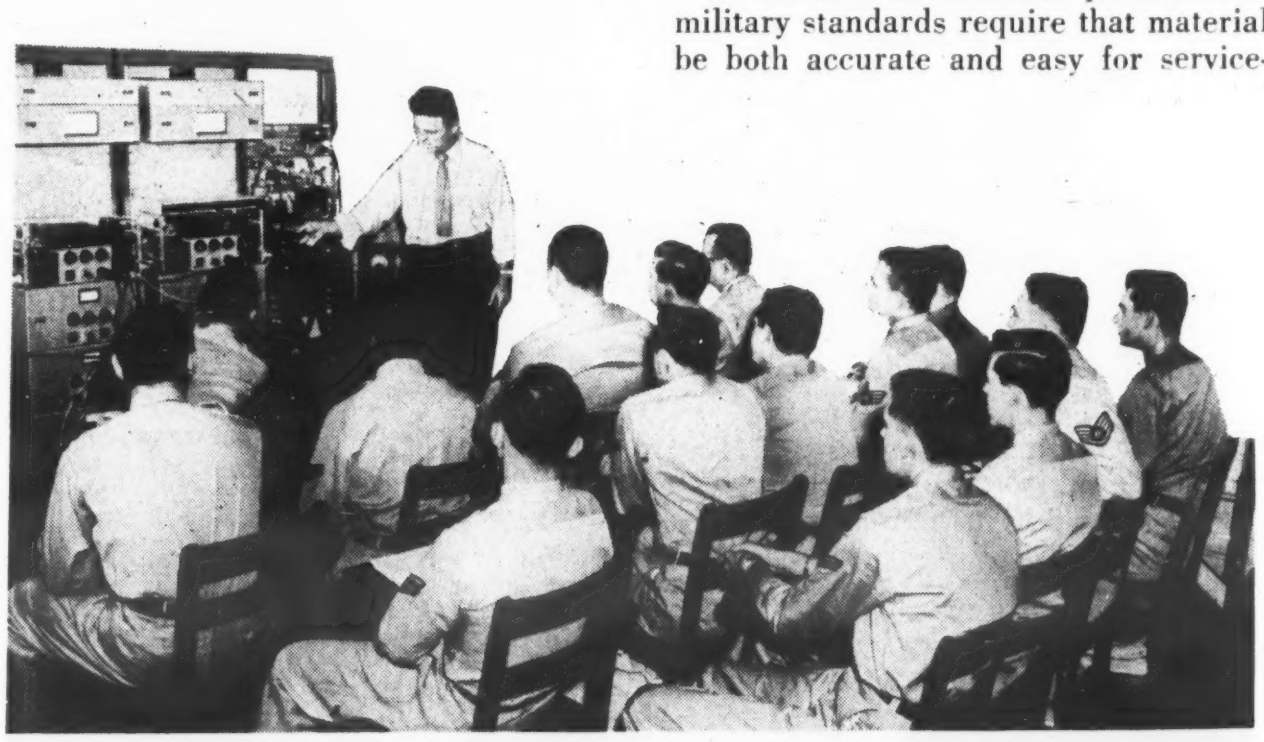
In addition to having the training and broad experience of RCA back of him—directed to high efficiency by supervision in the home office and field—each field engineer is cleared for access to classified projects.

Field engineers assigned to specialized projects know that if they can not cope with a situation at once, a message to the home office will quickly turn up the necessary information to enable them to solve the problem.

Gene Reed, on ADC location, was commended for design of a communications-control console, which now is standard with that branch. In the Far East, a pair of RCA engineers were praised for a circuit design which helped improve operation of the 584 radar.

Working with the home office, Jack Cook, at Puget Sound Naval Shipyard, was credited with effecting a substantial reduction in installation time on some new RCA radar gear.

In the field of technical publications, military standards require that material be both accurate and easy for service-



GIs learn the mysteries of electronics from a field engineer of RCA Service Company's Government Service Division. Such classes go on daily wherever U. S. Armed Forces are stationed in the world.

men with little technical training to understand. To produce these manuals, engineering reports, study courses, instruction books, TM's and TO's, the division maintains an experienced corps of writers, editors, artists, draftsmen and photographers. These men have turned out literature on such subjects as fire-control systems, sonar, radar, computers, Navy & Air Force guided missiles, search and height-finding radar, tape recorders for the Air Force, submarine and destroyer alarm systems, direction finders for the Coast Guard, European and domestic microwave networks, and point-to-point relay handbooks.

Electronic Demonstrators

The Government Service Division pioneered in the development of electronics trainers. The early RCA Dynamic Demonstrator was a tremendous asset in explaining to students the principles of the superheterodyne receiver. When a similar demonstrator was considered for teaching the principles of the TV receiver, it was thought by some people to be impractical—until they saw it in action. Immediately, the dynamic demonstrator was accepted as the best means of clarifying TV principles and operation. The entire electronics industry has benefited from this development.

RCA's dynamic training devices are designed to speed up the training cycle and to permit broader scope. With these devices, students link theory with practice. Working on actual circuits, they quickly develop manual dexterity.

There are two basic models, one for the instructor, another for the student. The instructor console (Model No. 160) is designed for teaching either basic or advanced circuits. The teacher builds typical systems merely by adding panels and plug-in components.

There are 36 scratch-proof, burn-proof panels with laminated circuits. Panels are surfaced for crayon or chalk. A black background, with yellow circuit lines, provides maximum readability with minimum glare.

Student model is a laboratory workshop. With this the student may match the instructor circuit for circuit. Faulty components are available to give trouble-shooting experience.

For 12 years, RCA has been helping the military train capable technicians and instructors. Factory-training schools are a natural for this company, with its tremendous manufacturing organization, modern laboratories and specialized talent.

The Government Service Division has developed "package training" for military training centers. It offers instructors who teach basic and advanced electronics, in addition to specific commercial and military radar and communications equipment. These teachers, aided by the latest in training aids, have the field engineer's approach.

The world-wide, on-the-job training activities of RCA field engineers cover many electronic equipments, from many plants. The division is ready to supply an instructor or an entire staff; it is equipped to offer advice or the whole package.

Special Projects Activity

Newest star added to the service program is Special Projects activity, developed to provide a service the military might need, and find unobtainable.

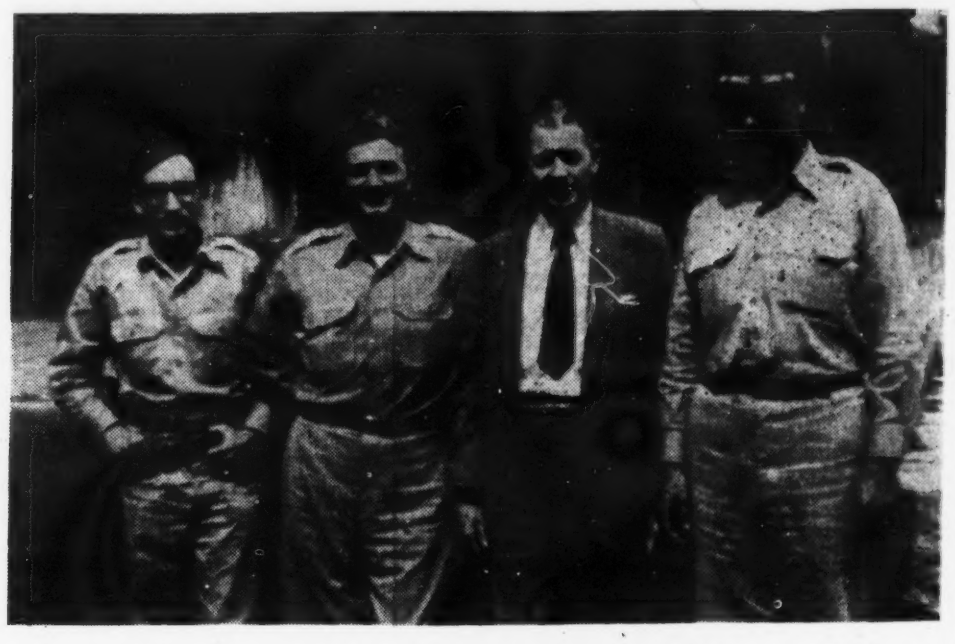
RCA has furnished Army Ordnance with a quality-control laboratory for electronics-devices. Specifications, performance, maintenance standards, and improvements are checked here. Equipment under scrutiny in this plant, which was laid out entirely by RCA, comes from many contractors.

Large-scale repairs and modification are handled at this lab. For the Signal Corps, the division has repaired and modified more than 10,000 walkie talkies. It has just completed an electronic-modification kit designed for installation aboard all destroyers. The RCA Service Company is also assisting the Navy in installation planning and systems-engineering. In selecting personnel for military field engineering assignments, the Government Service Division weighs heavily the personal characteristics of integrity, reliability, maturity, and the ability to get along with people. The field man must have good character as well as technical qualifications. He is particularly instructed to be a good ambassador for America when on foreign assignment.

The many important military electronics programs in which RCA field engineers work are directed by the Armed Forces. The job of the RCA field engineer is to assist the military command to which he is assigned in the attainment of its electronics or communications mission in every way in which his training and experience qualifies him. The primary mission of a contract field engineer is training and the RCA Government Service Division feels it is their mission to assist the Armed Forces in building up their resources of qualified manpower. Each RCA field engineer is instructed to undertake his training mission with the objective of building up the skills and technical knowledge of Armed Forces personnel to such a degree that he will work himself out of that job as rapidly as possible. But there is always more work awaiting him.

This is the RCA 5-Star Program. It is a picture of the combined available talent of the Government Service Division of the RCA Service Co. RCA will continue to utilize these valuable facilities to better assist our Armed Forces in maintaining world-wide supremacy in electronics.

RCA field engineer George P. Vrattos, W1LNZ, brings instruction with a smile to a group of airmen at MARS station AF7FAE in the Pacific Northwest area. Mr. Vrattos is one of a global network of RCA field engineers.



Time-out in Korea is taken by P. B. Reed, (2nd from right) vice president in charge of the Government Service Division, RCA; Bill Fisher, RCA field engineer; Col. H. H. Moreland; and Col. J. R. McNitt, head of the 5th AF Communications.

FLAMES LICKED AT THE TRUNKS of the huge trees and scrappy undergrowth. Animals scurried for safety. The swirling, acrid smoke hung like a shroud blotting out the sun.

A short distance away a young man stood beside a radio-equipped jeep talking into a microphone. His face was haggard from lack of sleep and his skin was the same ruddy hue of the flames—burned by long exposure to the intense heat. His once natty uniform was sweat and smoke-stained.

"That's right, the fire is spreading to the north and west. The wind picked up and the flames jumped the road," he spoke crisply into the mike. "Try to get me a relief. I've been in this inferno for nearly 48 hours."

The young man was a Civil Air Patrol radio operator. The scene was near Sandstone, Virginia, in October 1952. The occasion—one of the worst forest fires in the state's history.

For over two weeks radio operators of the Virginia Wing of CAP relayed messages from the fiery hell to volunteer and state fire fighters. In some instances only CAP members were battling fires.

The first report out of the fire area revealed that CAP communications units were among the first volunteer groups to arrive in the field. Capt. James R. L. Fitzgerald, CAP, wing director of communications, ordered all Virginia stations to stand by as soon as

by
S/Sgt. Jesse Nesbitt, USAF

he was alerted for the emergency. He issued orders for squadron communications personnel in the fire areas to report immediately to rangers, police or fire officials for duty.

Telephone lines between ranger stations were burned out by the raging fire. CAP sent portable stations and operators into fire areas with each group of fire fighters. Their job was to keep rear echelon officials apprised of the situation.

In the area around Taswell, Bandy, Amonate and Richlands, CAP members of the Richlands Squadron moved into action. Under the command of Maj. Grady Dalton, they moved into the fire areas. This unit supplied facilities for carrying emergency traffic from the forward posts to fire fighting officials and marshalling centers for fire fighting crews. Mobile units were kept on the go, constantly checking reports of new outbreaks and pin-pointing fires.

During the first week of the fires the battle against the fiery invader looked helpless. Reports such as, "Fires continuing . . . no precipitation in fire areas" made the situation seem hopeless.

Then, in the second week of November the fires subsided. Weary, begrimed radio operators went home for some sleep. The next day they were back at their regular civilian occupations. The smoke-stained CAP uniforms were in the cleaners. Another job well done by CAP's radio operators.

And thus it goes for the radio operators of the CAP network, the largest of its kind in the world. At all times there are some 10,900 fixed, semi-fixed, mobile and airborne radio operators in CAP ready to move into disaster areas.

These men are not paid for their services. The CAP is strictly a volunteer organization — official auxiliary of the U. S. Air Force by Act of Congress —commanded by Air Force Maj. Gen. Lucas V. Beau, as CAP National Commander.

CAP's radio network is similar to a regular military organization. Each wing—one in each state and territory—has its wing network. Higher up the ladder is the Region network. At the top is VP at National Headquarters, Bolling AFB, Washington, D. C.

All CAP radio operators are officially licensed by the FCC. These operators are well versed in disaster operations procedures . . . which in all probability will be urgently needed in months to come; for with peculiar regularity come the major national emergencies in order—tornadoes, blizzards, floods, forest fires and aerial searches for downed planes from coast to coast. And CAPers coast to coast are called upon to fly and fight each one of these in their voluntary role as USAF auxiliary.

CAP members of the Richlands (Va.) Squadron discuss the effect of shifting winds on the forest fires.

The Richlands CAP mobile communications unit works hard during the forest fire seige in Virginia.

Market Reports

by Louis Baker

Chief, Market News Leased Wire Section,
Production and Marketing Administration,
U. S. Department of Agriculture

"HOG RECEIPTS AT CHICAGO TODAY were somewhat below yesterday and butchers closed steady to 50 cents higher. Choice 180 to 240 pound butcher hogs brought $18.50 to $19.50, *according to the U. S. Department of Agriculture.*" Before the announcer was able to say more, you probably turned your radio to another station with the feeling that commodity market reports were nothing you wanted to hear.

This is not the case with several million American farmers who regularly place market reports along with weather and news as the three things they want most from radio. Market news is considered so important a public service that during the past year more than a million broadcasts were presented over some 1,300 radio stations.

A survey of farmers in Iowa showed 49 percent of them read day-to-day market reports in newspapers and 92 percent listened to day-to-day broadcasts on radio stations.

Furthermore, it does not take much more than a casual look in any of more than a thousand daily papers to find some of these same market reports. They are considered essential to the marketing of farm products. However, to be of practical use, they must be made available quickly so that farmers and others who use them as a basis for marketing decisions will not find the information "out-of-date." Timely availability of these reports is due in large measure to the U. S. D. A. market news leased wire system.

This wire service ties together nearly 100 year-round and some 30 seasonal offices of the USDA market news service. The communication requirements of some offices are met by the use of teletypewriter exchange (TWX) facilities, and in California the state short-wave radio system is also utilized. These offices are located in the principal terminal markets and major producing areas. They cover livestock, meats, wool, fresh fruits and vegetables, dairy and poultry products, grain, cotton, tobacco, naval stores, and other farm products.

The Department uses these leased wire facilities to collect numerous crop, livestock and cold storage reports which are tabulated in Washington and disseminated simultaneously over these same leased lines to the nation so that every part of the country and every segment of the Agricultural industry has access to these reports at the same time. These reports are also released at the same time to the various news services and press associations for transmission to newspapers and radio broadcast stations.

The reports reflect condition, acreage, production, yield, storage, etc., and therefore affect the prices of commodities traded on the leading exchanges of the world such as the N. Y. Produce Exchange, Chicago Board of Trade, N. Y. Cotton Exchange, Chicago Mercantile Exchange, New Orleans Cotton Exchange, Minneapolis Grain Exchange, Winnipeg

The Author

In his position as Chief of the Leased Wire Section, Louis Baker is responsible for the operation of the 11,000 mile system for Market News, and for a second system of over 5,200 miles used for purchase, price support, custody, and disposition operations.

s are RUSH Copy

This is the first of a group of articles to appear in SIGNAL concerning Government Communications. In this article about the Dept. of Agriculture, we see the necessity of superior communications for the efficiency of the commodity market.

Grain Exchange, Liverpool Cotton Exchange and others; also the livestock exchanges in Chicago, Omaha, Denver, Ogden, Ft. Worth, Cincinnati, St. Joseph and other livestock centers.

As is the case with most forms of communication, these wire facilities are far different from those used when the market news service was in its infancy.

The market news service began in a very small way in 1915 and was devoted exclusively to fresh fruits and vegetables. But from the beginning its importance was quite apparent and its growth seemed inevitable. A year later, in 1916 market news on livestock was added, and the exchange of information between offices had become important. And, too, this business was expensive in relation to the budget. The monthly cost was running something over $10,000 and market information on other commodities was wanted and seemed essential.

The question was—how to expand the service and cut costs. The answer—leased telegraph service. At that time the market news offices were maintained on a year-round basis in 12 cities, from Boston and New York to Chicago, Minneapolis, Kansas City and Denver. A wire system was leased to connect all offices except Denver, and more telegraph operators were employed. The result—costs were cut

A view of the teletypewriter terminal for sending and receiving market news reports in the Office of Marketing Services, Department of Agriculture, Washington, D. C.

by two-thirds and the transmission of reports was far more rapid and comprehensive. The records indicate that since then there never has been a serious question as to the place of leased wire facilities in the Department of Agriculture's market news service.

Many things are responsible for the growth and the changes which have taken place in bringing the market news leased wire system to its present scope and importance. Among these, were the insistent demands for broader coverage of fruits and vegetables and livestock and for reports on grain, dairy and poultry products. and cotton. Services on grain and on dairy and poultry products were added in 1918, and on cotton in 1919.

Another important factor in the development of the market news service and the leased wire system was the shift of centers of production from areas close to major markets to concentrated areas hundreds of miles away. The leased wire system has not only kept pace with the technological improvements of production and marketing, but also with their changing patterns, and at the same time keeping up with technological improvements in the communications art.

Originally a manual morse code system, the conversion to teletype operation began in 1939 and the first teletype circuits were operated at 40 words per minute. Due to increased traffic requirements this system was increased to 60 words per minute in

1943 and to 75 words per minute in 1947 and 1948.

From the beginning the leased wire facilities have been operated as a "multi-point system." The system has grown steadily and as more and more cities were added, new circuits were established and today the market news leased wire system comprises 9 circuits operated 8 or more hours a day, and the traffic is running around 4,300,000 words per month. The circuits and the number of offices each serve are as follows:

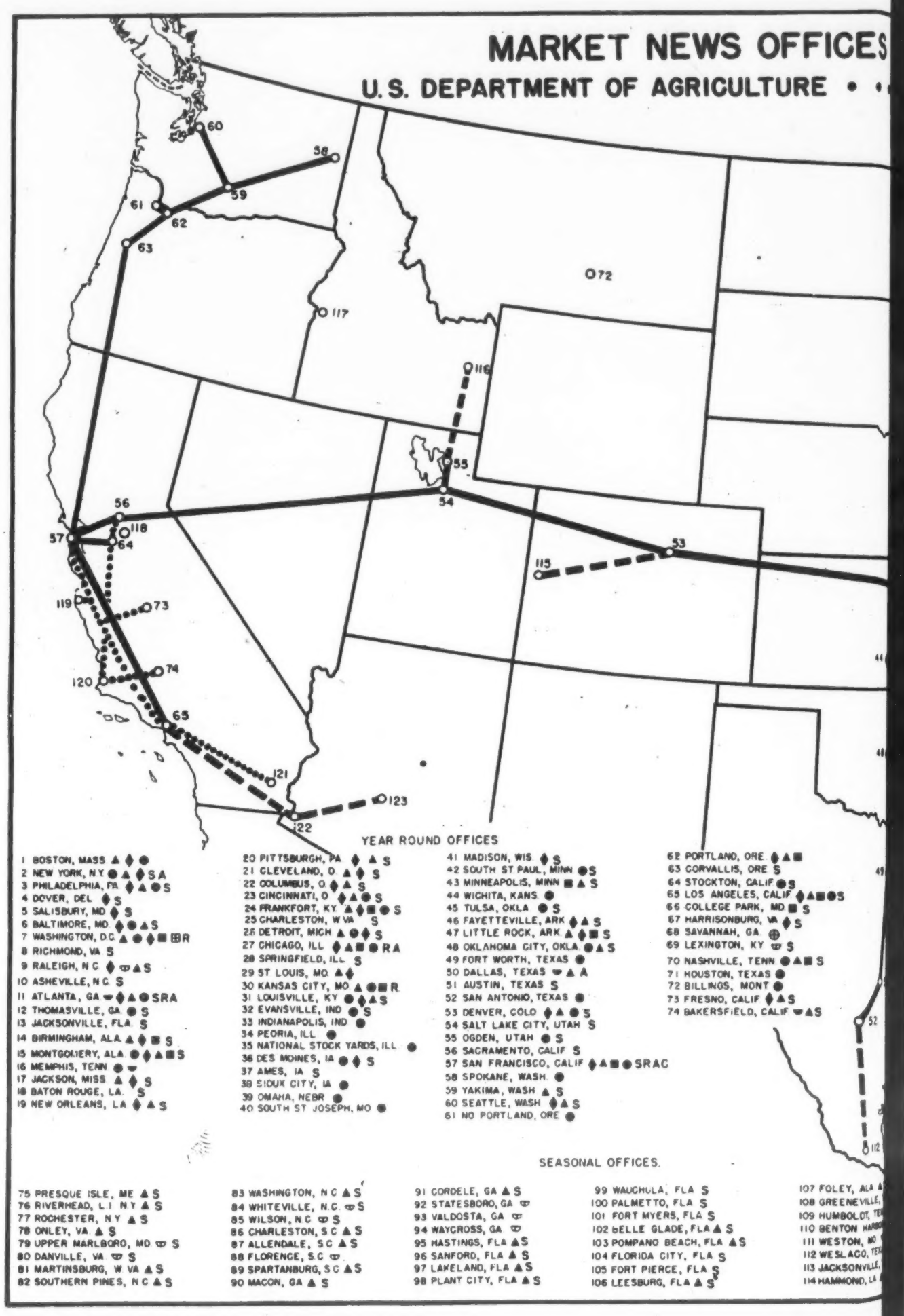
	Offices
Eastern—Washington to Boston	11
Southern—Washington to Atlanta (including Florida points Nov. through June)	20
Livestock—Washington to Kansas City	16
Central—Washington to Kansas City	17
Southwestern—Kansas City to Weslaco Texas	13
Western—Kansas City to San Francisco	10
Northwestern—Chicago to Minneapolis	5
Gulf—Atlanta to New Orleans	9
Pacific Coast—San Francisco to Seattle (and San Francisco to Phoenix)	13

Tape relay centers are located at Atlanta, Chicago, Kansas City, San Francisco and Washington, D. C.

Speed, accuracy, and flexibility are important but perhaps the most distinctive feature of this leased wire system is its low cost per word transmitted and picked up simultaneously by from 10 to 15 offices—about one-half cent a word for messages that cross the Nation. The service operates with a very small number of teletype operators and it is a far cry from the day when it was necessary to employ a telegrapher in every office and several at relay points. For those interested in the technological side, the 11,000 miles of wire and the 9 circuits are handled by 8 teletype operators in Washington. 3 in Chicago. 4 in Kansas City. 3 in San Francisco. 2 in Atlanta. All are relay points and relay work takes a large share of the time of the operators. Eighty percent of the messages originate in the local market news offices and are put directly on the teletype circuits by clerks in these offices. This method of operation keeps costs to a minimum. but of course does not provide as rapid transmission from the offices using direct keyboard transmission as from those whose volume of traffic and availability of funds justifies automatic transmission equipment.

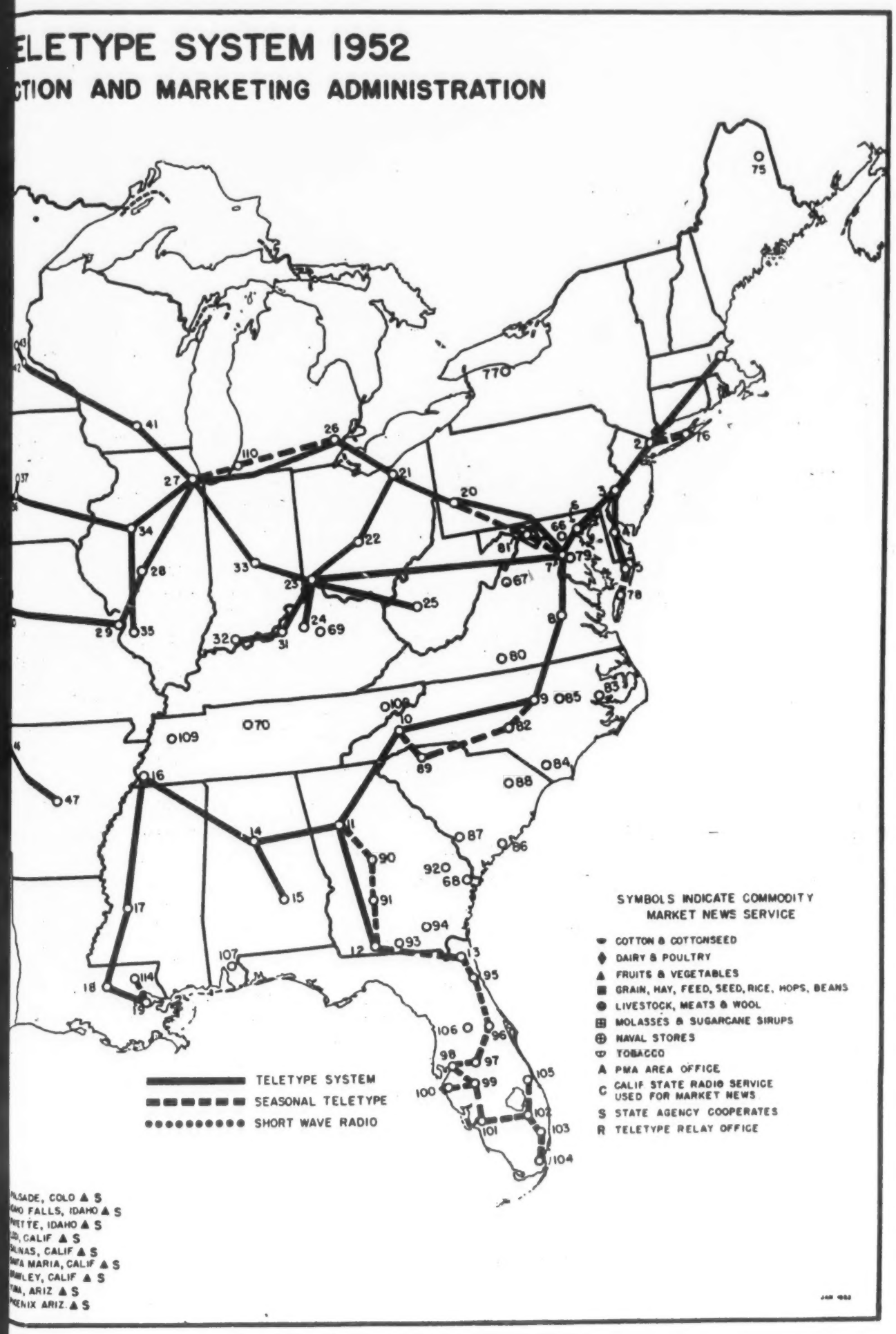
Excerpt from the Schedule of Market News

City & State	Office Call	Bell Signal	Hours MON. THRU FRI.
Eastern Circuit (8:00AM-5:00PM EST)			
Washington, D. C.	MK	1	8:00AM-5:00PM
Baltimore, Md. (F&V)	BO	2	8:30AM-5:00PM
Baltimore, Md. (Livestock)	BX	1-2	8:00AM-4:00PM
Boston, Mass.	BN	5	8:30AM-5:00PM
Dover, Del.	DO	2-4	8:30AM-5:00PM
Hartford, Conn.	HD	6	8:30AM-5:00PM
New York, N. Y.	NY	4	8:30AM-5:00PM
Onley, Va.	ON	1-4	8:30AM-5:00PM
Philadelphia, Pa.	PA	3	8:30AM-5:00PM
Riverhead, L.I., N.Y.	RV	2-3	8:30AM-5:00PM
Salisbury, Md.	SA	1-3	8:30AM-5:00PM



Leased Wire System — Teletype Operation

City & State	Office	Bell	Hours
Western Circuit (10:00AM-6:00PM EST)	Call	Signal	MON. THRU FRI.
Denver, Colo. (F&V)	DV	1	9:30AM-5:30PM
Denver, Colo. (Livestock)	DX	2	9:30AM-5:30PM
Idaho Falls, Idaho (F&V)	ID	8	9:30AM-5:30PM
Kansas City, Mo. (Relay)	KA	6	9:30AM-5:30PM
Ogden, Utah (Livestock)	OG	4	9:30AM-5:30PM
Palisade, Colo.	WS	1-1	9:30AM-5:30PM
Sacramento, Calif.	KO	5	9:30AM-5:30PM
Salt Lake City, Utah	SL	9	9:30AM-5:30PM
San Francisco, Calif. (Area)	MC	7	9:30AM-5:30PM
San Francisco, Calif. (Relay)	SF	3	9:30AM-5:30PM



Service is also speeded, errors eliminated and costs kept to a minimum through the use of reperforators in the relay points.

In the operation of this market news system, a detailed schedule of transmission has been in force for a number of years. This schedule takes into consideration the time that information is available and the time it is needed in other offices. Every effort is made to move the information as soon as it is available. If two offices have their reports ready at the same time, the decision which is to move first is determined by the importance of the reports and the use which will be made of them at other offices. The schedule is a tight one and the amount of idle time is a rare thing, about two percent.

The increased demands for market news are the reasons for increasing the speed of the circuits during recent years. Whenever free time is available, there are always some administrative, personnel and other messages ready to go on the wire and most of them deal directly with the market news work. The agency officials recognize that priority must be given to market news, and instructions make it clear that other material is to be carried only if it will not interfere with the market reports.

What about the future? No one is safe in making an outright prediction but if the past is any guide, the requests for market news by leased wire will continue to increase. There will be demands from various segments of the trade to be connected with the leased wire system (at present some market news is relayed to private wires of several segments of the trade). The Nation's news services and other segments of the trade will undoubtedly continue to seek a tie-in with this leased wire system in order that they may provide more rapid service to radio, newspapers and the agricultural industry.

The present policy, and one which undoubtedly will continue, is that this leased wire service is set up as a part of the market news service to provide a rapid exchange of information between offices so that the information may be distributed without favoritism to any groups or individuals.

"I Remember . . ."

These articles are quoted from newspaper clippings supplied by Rawson E. Stark.

THREE BOY INVENTORS

WIRELESS TELEGRAPHY

The Reward of Perserverance

Sept. 12, 1908 — A notable achievement in wireless telegraphy on the part of three boys, one aged 16 and the other two 17 years, has attracted some public attention. The boys, Rawson Stark, Stanton Hicks, and Cyril Brandon, have for two years been experimenting, and as a result of patient labor and many failures, they have fitted up three stations, one at Kew (Caversham), another at Anderson's Bay, and a third at Ravensbourne.

This evening messages from the Mayor of West Harbour to the Mayor of Dunedin were sent and replied to between Anderson's Bay and Ravensbourne stations, and a message was also flashed across these points by the boys and then sent to the Postmaster-General and Parliament.

The sending and receiving of the messages referred to were supervised by Messrs. A. J. Talbot and E. Flack (of Dunedin Telegraph Department), and both operators speak in high terms of praise of the success achieved by the lads. The rate at which the messages were sent was about five or six words per minute.

A number of citizens connected with the Railway Department, shipping interests, and electrical engineering, were present, and spoke highly of the work accomplished.

Subsequently, a message was received from the Prime Minister, conveying to the young inventors the sincere appreciation of himself and members of Parliament for their message.

YOUNG MARCONIS

THE DUNEDIN INVENTORS

NOTEWORTHY ACHIEVEMENT — WARSHIP MESSAGE PICKED UP

Sept. 13, 1908—The achievement of the three boy inventors who were responsible for the first official message in New Zealand per land "wireless" has caused great interest. In time to come it will be something to remember that the first working installation of the Marconi marvel was set up around Dunedin by three lads, who learnt the principles and the mechanical details from the few books that were accessible to them and personally made all the apparatus from odds and ends and such misfitting gear off unrelated systems as they could manage to lay hands upon.

These lads are Rawson Stark, son of Mr. E. E. Stark, electrical engineer; Cyril Brandon, employed by Messrs. Turnbull and Jones, electrical engineers: and Stanton Hicks, son of Mr. G. H. Hicks, shipping reporter on the staff of the Otago Daily Times. Hicks is now 16 years old, and the other two each a year older. They began experimenting about a couple of years ago, and gradually getting together materials for equipment, they have by degrees built up three stations. Each lad has one at his home, thus completing the circuit between Ravensbourne, Anderson's Bay, and Kew. Their parents have assisted as far as possible with advice, and a limited amount of cash, and a few friends interested in the scheme, and anxious to encourage the young experimenters to keep their thoughts on science in preference to sport, have also lent aid; but the actual work and most of the thinking have been done by the lads themselves.

At the demonstration given last night, two of the boys went to their stations in Mr. Hick's back yard, at Ravensbourne, half an hour before the arranged time for the demonstration, and began to search the air for contact. One of the lads put a pair of receivers to his ears, listened and heard nothing; then he proceeded to put in and take out little pegs, and so shorten or lengthen a copper wire overhead, and this went on till he heard a faint clicking. Further adjustment of the pegs strengthened the signal, and then he knew that he was in touch with the instrument on which the third lad was sending from Anderson's Bay.

Once, a little while ago, this experimenting led to a peculiar result. Young Hicks got a message which he quickly discovered was not from his chum. He could not make it out, but got a few words here and there, and setting down the dots and dashes—for it is the Morse code which the "wireless" signals are read by — he thought that he had chanced to partially intercept a message from one warship to another. Subsequently, inquiry revealed the astonishing fact that the Ravensbourne had picked up a message from H.M.S. *Pioneer*, then in Foveaux Strait, meant for another warship in Lyttleton.

Thus, by pure accident, the lads discovered that their system, constructed for a radius of a couple of miles, had a reach far beyond their hopes. It is now said that even with their imperfect appliances they could, if so desired, talk to another person (if he had a receiver) 180 miles away.

Editor's Note: We are planning a series of stories based on reminiscences of pioneers in communications. If you have any items in your memory, or in your files, which would be of interest to our readers, please send them to the Editor. All old clippings, pictures, etc. will be carefully handled and returned after use.

This story made headlines in New Zealand newspapers in 1908. It is here retold with a detailed explanation by one of the trio, Rawson E. Stark, now Vice President of the Stupakoff Ceramic & Manufacturing Company.

AS A YOUNGSTER IN MY TEENS, I accompanied my parents to New Zealand in 1904, remaining to 1913.

My intense interest in a demonstration of a "coherer" by Charles McCarthy of San Francisco in the year 1903, and the technical literature in the "Electrical World and Engineer," to which my father subscribed, and articles in the "Scientific American" concerning Massey, Stone, DeForrest, Pickard, and numerous other detectors of the "imperfect contact" type, as well as early Audions was a great inspiration and a challenge to a youngster's ability to copy or otherwise become an experimentalist.

The only source of telephone receivers, relays, etc., in New Zealand was from the government owned Telephone and Telegraph offices, and likewise, any wire, burnt-out field coils, storage batteries that a youngster could secure was from the scrap heap of the electric power company, or some automobile agency.

Yours truly had two pals who likewise were to become the "trio" who pioneered amateur wireless in the southern "Dominion," Stark, Hicks and Brandon (S, H & B) which is no reflection on the Germany company with those initials.

Each of us had our work shops, and oddly enough each was equipped with such articles as a lathe and a drill press — all operated from foot power, but mine later was connected to power drive from a motor which I made from sheet steel from which laminations were made by drilling and punching and later winding with #20DCC wire from a burnt-out generator field coil. I also possessed a milling attachment and dozens of gadgets made to do special jobs. Clocks and watch parts were in time collected and added to the "heap."

Pato & Radford celluloid-cased motorcycle storage batteries with wrecked positive plates were collected, grids recast in plaster of Paris molds, and "pasted" and formed.

The only form of D.C. at first was from a 500V D. C. street car system: later, however, transformers and aluminum rod rectifiers, and later a homemade generator set was constructed.

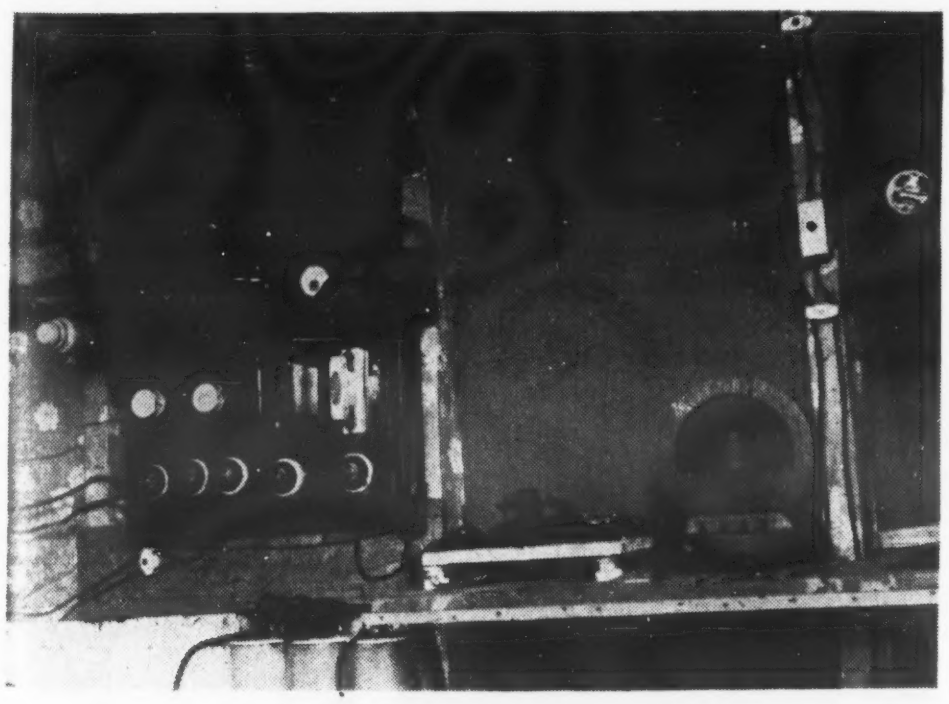
With the help of the above tools, batteries and a couple of 10" Apps spark coils, and later a rotary spark interruptor, and later by a set of silver-quenched gaps, the "young Marconis," as we were called, and with the aid of a home-made Marconi Magnetic Detector, of head phones fashioned from two 100 ohm Ericson receivers weighing almost a ½ pound, we, with the cooperation of regular New Zealand Government telegraphers, staged a public demonstration which has been recorded in the annals of the N. Z. Parliament as the first communication publicly announced in that area over land and water without wires. Congratulatory messages were transmitted by the Mayors of Dunedin and Ravensbourne to members of Parliament, and to Sir Joseph Ward—then Prime Minister—and return replies were in turn transmitted back over land lines to Anderson's Bay, to the Mayors.

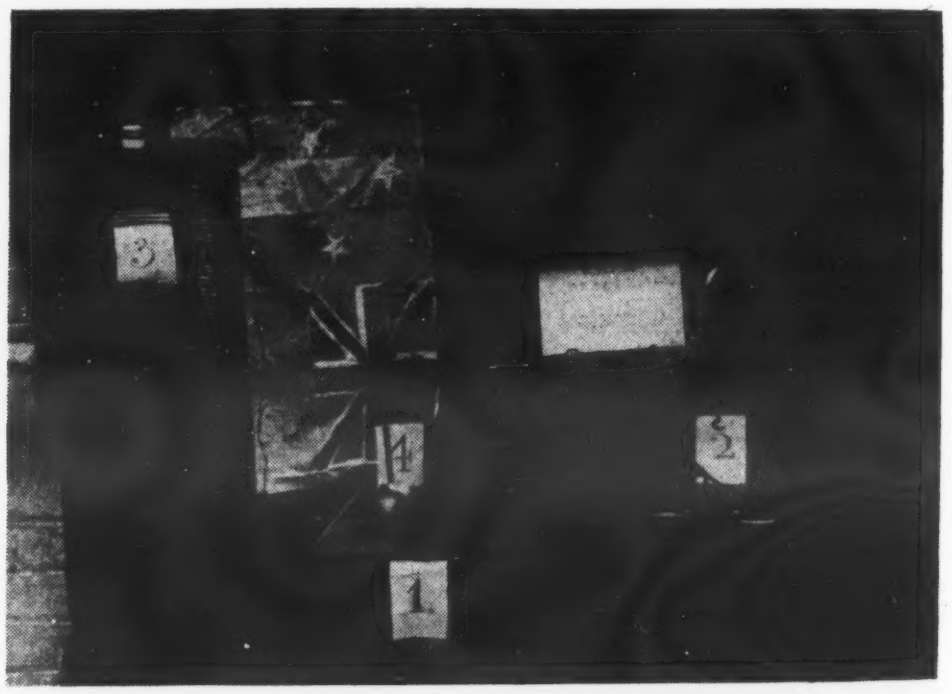
Photographs appeared in every "weekly" in New Zealand and in the official telegraphers' monthly magazine, the KATIPO (1909).

With the interest thus created, the "New Zealand Telegraphs" installed the first land station NZW in Wellington, a quenched gap unit, and ships of the Huddard Parker S.S. Co. followed by the N. Z. Steamship Co. installed Telefunken equipment.

(Continued on page 78, col. 2)

These photographs were taken in October, 1908, of some of the instruments and equipment used by the young communicators in their wireless telegraphy work in New Zealand. This particular installation was located at Ravensbourne Station.





Automatic Teletypewriter Switching System for the Signal Corps.

by 1st Lt. William F. Spanke, SigC

IN MANY TACTICAL SITUATIONS, voice communications by wire or radio are the only available means of acquiring the necessary instantaneous contact between the message originator and the action addressee. A forward observer, for example, must be able instantaneously to "Call the Shots" for a gun battery. There are many other military situations, however, in which a written message is much more desirable than a spoken command. Long requisitions replete with difficult letter-number combinations and battle plans which are highly classified for security reasons, do not lend themselves to voice communication but, nevertheless, must be delivered expeditiously. For this type of traffic the Signal Corps uses teletypewriters.

Teletypewriters are moving nearer to the battle lines than was dreamed of a few years ago. Newly designed light and rugged equipment makes this possible. At these low echelons of command, teletypewriter communications are usually established by direct electrical connection between the originator's station and the addressee's station, either by private line or through plug and jack switchboards. Since teletypewriter circuits operate on d-c pulses or a very narrow band of audio frequencies and since the traffic volume is comparatively low, provision of adequate low echelon circuits is normally a by-product of the required voice communication circuits.

At higher echelons of command the type of traffic which requires teletypewriter transmission increases tremendously. Distances to be covered increase to world-wide proportions. The provision of circuits now becomes a major consideration. Private line service must be restricted to a few very important cases. Plug and jack switchboards became impracticable due to the poor circuit efficiency resulting from building up connections through several switchboards, probability of finding parts to the route busy, slowness in answering, etc.

Semi-Automatic Operation

Fortunately, teletypewriter messages are not so "perishable" as telephone calls. It is relatively simple to automatically reproduce teletypewriter signals in the form of perforated tape, then to automatically read the perforations and repeat the message as another tape or as page copy. Using this facility, the military services adopted during World War II a *tape relay* method of handling high-echelon traffic. Figure 1 shows a typical portion of a tape relay network. A message can originate at any tributary station and be reproduced as tape at the first relay center. Using this tape (and other tapes similarly prepared) the message is retransmitted through as many relay centers as necessary to reach the destination. Transmission from the final relay center results in a page copy at addressee's station.

It can be seen that each message can flow from station to station when the circuits are not otherwise busy. It can further be seen that if one link in the route is busy the message can be held at any point for as long as necessary. This method of operation achieves almost complete utilization of trunk circuits during traffic peaks while reducing the number of human operations formerly required in manually retransmitting each message at each relay center.

To reduce human effort further, an operating procedure and message format were designed specifically for this type of operation. Figure 2A shows a typical message heading. The channel number allows a check off system to insure that no messages are lost. The precedence indicator, representing one of six degrees of precedence, establishes the relative order of handling of the message. The routing indicator identifies the addressee and assists in determining the route to be used in reaching him.

In the semi-automatic method of tape relay operation an operator confirms the validity of the channel number and records its receipt. She then examines the routing indicator, refers to a chart to determine the correct outgoing channel, carries the message tape to a tape holder near the transmitter on that channel and inserts the tape into the holder in accordance with the message precedence with relation to other messages which might be awaiting transmission. In large relay stations specially trained personnel are frequently utilized to

make the routing determination. A transmitting operator removes the tape from the tape holder, and inserts it into the appropriate transmitter. A new channel number is automatically affixed preceding the actual message transmission to identify the transmission to the next station. The new channel number and the complete message transmission are recorded on a monitoring typing reperforator, to form a semi-permanent record of the transmission.

If the message is a "Multiple Call" message destined to two or more outgoing circuits it is hand carried by the receiving operator or routing clerk to another section of the relay station where specially trained operators determine the new headings appropriate to each transmission, manually prepare such headings on separate reperforators and then completely retransmit the message tape to all these reperforators simultaneously. The result is a new group of tapes each preceded by appropriate handling instructions. Each new tape is hand carried to the appropriate tape holder and subsequently transmitted as in the case of the single call message.

It will be noted that the message is delayed at each relay station by the length of time required for receipt of the complete message as it is not practicable, under normal circumstances, to begin retransmission until the complete message tape can be detached from the receiving reperforator. The total delay is considerably greater in practice since it is not feasible to station a sufficient number of operators at the receiving positions to handle each tape immediately.

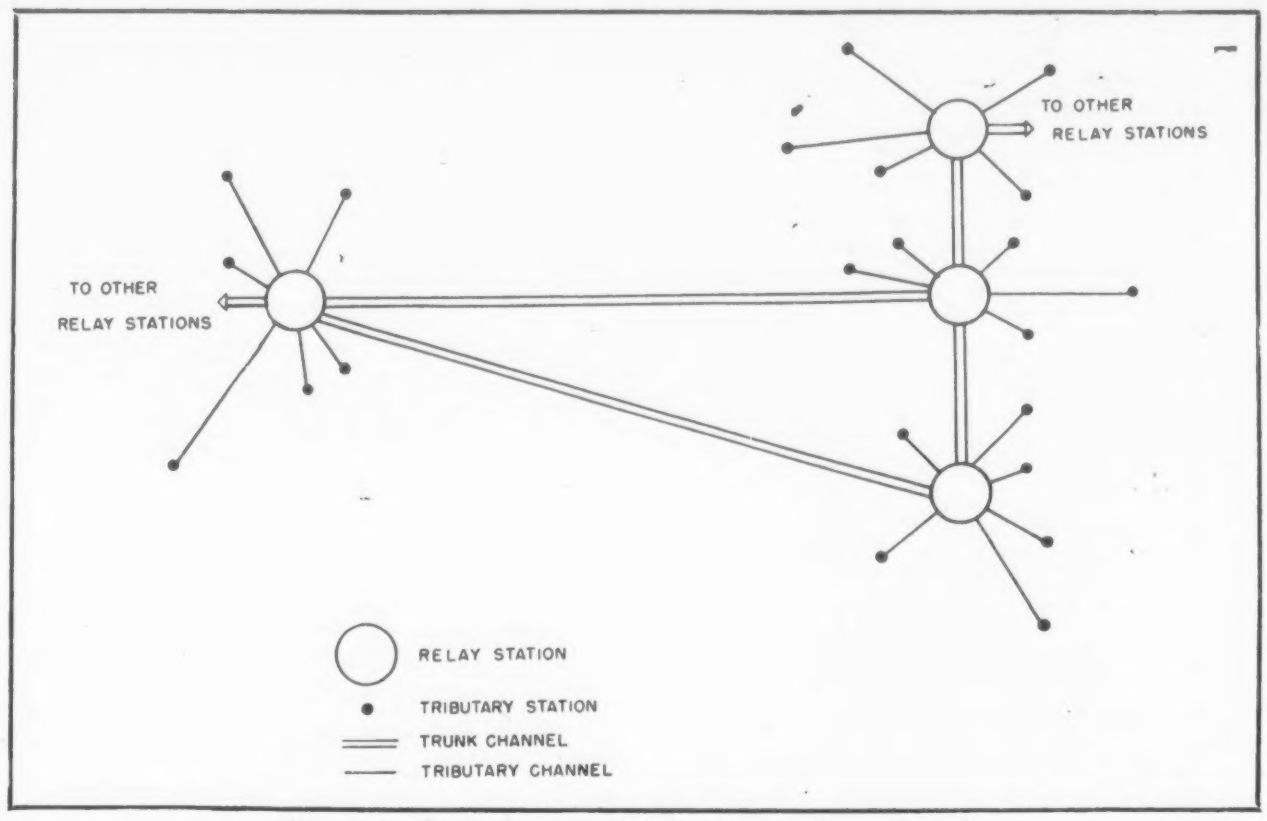


Figure 1. Typical segment of a tape relay network.

Automatic Operation

Replacing the human operations previously described with electromechanical functions poses a very interesting technical problem. The Army Signal Corps' answer to these problems is, currently, Teletypewriter Switching Center AN/GGC-2(XC-1). This equipment has been in eminently successful operation at Headquarters Fifth Army, Chicago, Illinois, since 17 December 1952. The outstanding success of this first model and a recent alteration of message format pointed specifically toward automatic switching, insures that the new versions of the system which are now under procurement will be even more efficient.

Some of the principal features of the system are:

1. The ability to act on a message almost simultaneously with receipt of the message heading. It is possible to begin receiving the message heading at its destination even before the message has been completely transmitted by the station of origin.

2. The ability to appropriately act upon the six degrees of military precedence including the ability to cancel transmission of messages of low precedence when required for immediate handling of high precedence messages.

3. A substantial reduction in the number of operating personnel.

4. The extensive use of "common" or "pooled" equipment resulting in a high degree of flexibility, reliability and economy.

5. Compatability with existing semi-automatic operations making unnecessary the simultaneous installation of similar equipment throughout the network.

Figure 2B shows the minor additions to the message format required for automatic switching. The start-of-message indicator and the end-of-message indicator are added automatically as a result of slight modification of the semi-automatic equipment which works directly into the Chicago Switching Center.

Detailed technical description of the system is beyond the scope of this article. Some of the operational features are depicted on the accompanying block diagram, Figure 3, and described in the following paragraphs.

Situation No. 1

A single call message of routine precedence is being received. No other traffic is in the switching center.

The message is reproduced on a standard typing reperforator in the incoming line unit. Tape emerging from this device extends through a "tape reader" and a standard transmitter-distributor. The tape reader is constructed to detect simultaneously all tape perforations representing each character and to convert them into electrical information which can be used for essential decoding and switching operations. As soon as slack tape develops, the tape reader begins operation but the transmitter-distributor remains inoperative. The tape reader first detects the perfora-

Figure 2. Tape relay message format.

A		B
FOR SEMI-AUTOMATIC OPERATION	FORMAT ELEMENTS	FOR AUTOMATIC SWITCHING
	START OF MESSAGE INDICATOR	XZXZXZX
EUAØ56	CHANNEL NUMBER	EUAØ56
RR UEALZ	PRECEDENCE AND ROUTING INDICATORS	RR UEALZ
--------	REMAINDER OF	--------
--------	HEADING	--------
--------	AND TEXT	--------
	END OF MESSAGE INDICATOR	,,,,,,,,

tions representing the start-of-message indicator. Detection of a correct indicator causes the tape reader leads to be switched to a channel number comparator where the channel number is checked automatically. Assuming that this check is completed successfully, the tape reader stops and a call is initiated for the services of the Director.

The Director finds the calling line and extends the tape reader leads to Director detecting relays. The tape reader resumes operation and feeds teletypewriter code (on a five-wire basis) representing the precedence indicator and routing indicator into the Director where the information is stored on relays.

To convert the teletypewriter code representing the routing indictor into a correct line number indication, the Director signals for the services of the routing translator. The routing translator receives the teletypewriter code information, decodes it, and translates it into an outgoing line number, and returns this indication to the Director. This action is accomplished in a matter of milliseconds. One important feature of the routing translator is its ability to properly handle any of thousands of routing indicators which are possible under the military routing indicator plan and to allow rapid alteration of either the letters of a routing indicator or the line number over which it should be transmitted. The routing translator is common to the entire office, further simplifying changes in routing indicator assignments.

It is now the function of the Director to select an appropriate cross office unit from the pool and establish a cross office connection. As no other traffic is in storage, all cross office unit switches are on normal. The Director sets the cross office selector switch to the first cross office unit, sets the outgoing line selector switch of that cross office unit to the correct line and marks the routine precedence in the cross office unit. The Director then releases itself from the incoming line unit, allows the incoming line unit tape reader to resume operation and the transmitter-distributor to begin transmission of the message from the incoming line unit to the cross office unit at a slightly higher speed than the incoming transmission speed. The total Director holding time, including the time required to read the required information from the tape, is a few seconds.

The cross office unit contains a typing reperforator to reproduce the teletypewriter signals from the in-

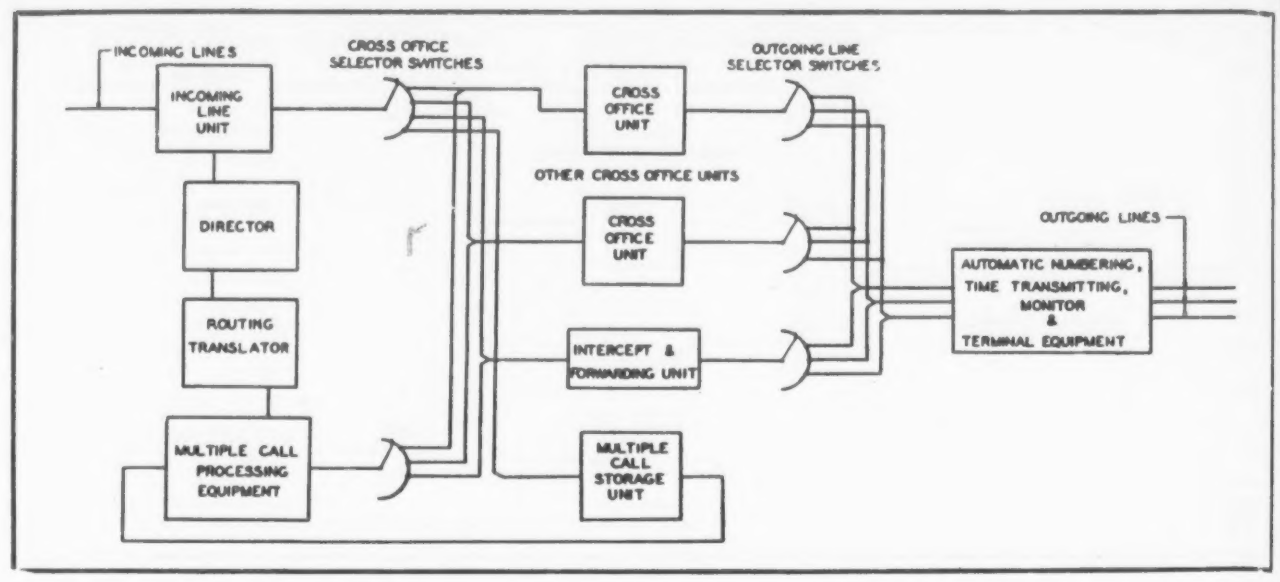


Figure 3. Teletypewriter switching center AN/GGC-2(XC-1).

coming line unit transmitter-distributor and a line speed tape reader and transmitter - distributor. When the start-of-message indicator is detected by the tape reader the automatic numbering equipment transmits a new start-of-message indicator, if required for this particular channel, followed by the next channel number appropriate for this channel. The entire message is recorded on a typing reperforator monitor to provide a semi-permanent record for the channel.

When the sending station finishes transmission of the message, the end-of-message indicator will be detected in the incoming line unit and advanced through the incoming line unit transmitter-distributor. This furnishes a signal indicating that the cross office selector switch may be restored to normal.

Shortly the end-of-message indicator is detected in the cross office unit tape reader and advanced to the transmitter distributor. This action signals for the time transmitter which transmits station identification, the time of day, a new end-of-message indicator and various teletypewriter functions.

Note that the start-of-message indicator and end-of-message indicator received from the sending station are absorbed in the switching operation and that new indicators are added. This is done to insure that accurately positioned indicators are always available at the next station.

Situation No. 2

A routine precedence message is completely stored in a cross office unit. Another routine message is being received for the same outgoing line.

Processing of the second routine message is accomplished as described in Situation No. 1 except that the Director finds a cross office unit with its outgoing line selector switch already positioned to the correct line. It also finds that the cross office unit contains a message of the same precedence as the message to be handled. The Director's job, therefore, is merely to set the cross office selector switch to the cross office unit. When the Director releases, transmission of the second message proceeds into the cross office unit.

Situation No. 3

A routine precedence message is being transmitted to a cross office unit. Another routine message is received over another incoming line destined for the same outgoing line.

Operation under this situation is similar to that encountered in Situation No. 2 except that the Director finds that the otherwise eligible cross office unit is busy receiving. The Director either finds another cross office unit which is eligible in all respects to handle the second message or, if none has been set up, selects an empty unit from the pool and sets its switches as described under Situation No. 1.

It is highly undesirable to hold the second message described above at the incoming line unit pending completion of transmission of the first message to storage. For example, high precedence messages might have to be stored at the incoming line unit if it were not possible to switch traffic from the incoming line unit immediately.

The facility for immediate switching typifies the high degree of flexibility achieved through the use of pooled equipment. It allows storage-facility traffic engineering to be accomplished for accommodating the entire office rather than for individual lines since the correct number of cross office units is instantaneously assigned automatically by the Director.

Situation No. 4

Due to a traffic peak several low

precedence messages are in storage in cross office unit and one of these messages is being transmitted to the outgoing line. A higher precedence message is being received for the same outgoing line.

Preliminary processing is accomplished in accordance with the preceding examples. If the message being received is not higher than priority precedence, the Director establishes a cross office path through either an empty cross office unit or one containing messages of the same precedence as that being received. As soon as outward transmission of one low precedence message is completed, further transmission from the cross office unit containing such message is locked out until the high precedence traffic is transmitted. If the message being received is of operational nature (one of the three highest precedences) transmission of the low precedence message is interrupted automatically, cancellation prosigns are transmitted automatically, and the high precedence message begins transmission. An alarm informs the attendant of the location of the high precedence message and the location of the interrupted message. An attendant repositions the tape containing the interrupted message to insure its complete retransmission when the high precedence message is completed and releases the alarm.

The use of the cross office unit pool permits this complete recognition and proper handling of all military message precedences.

Situation No. 5

A multiple call (book or multiple address) message requiring multiple transmission from the local switching center is being received.

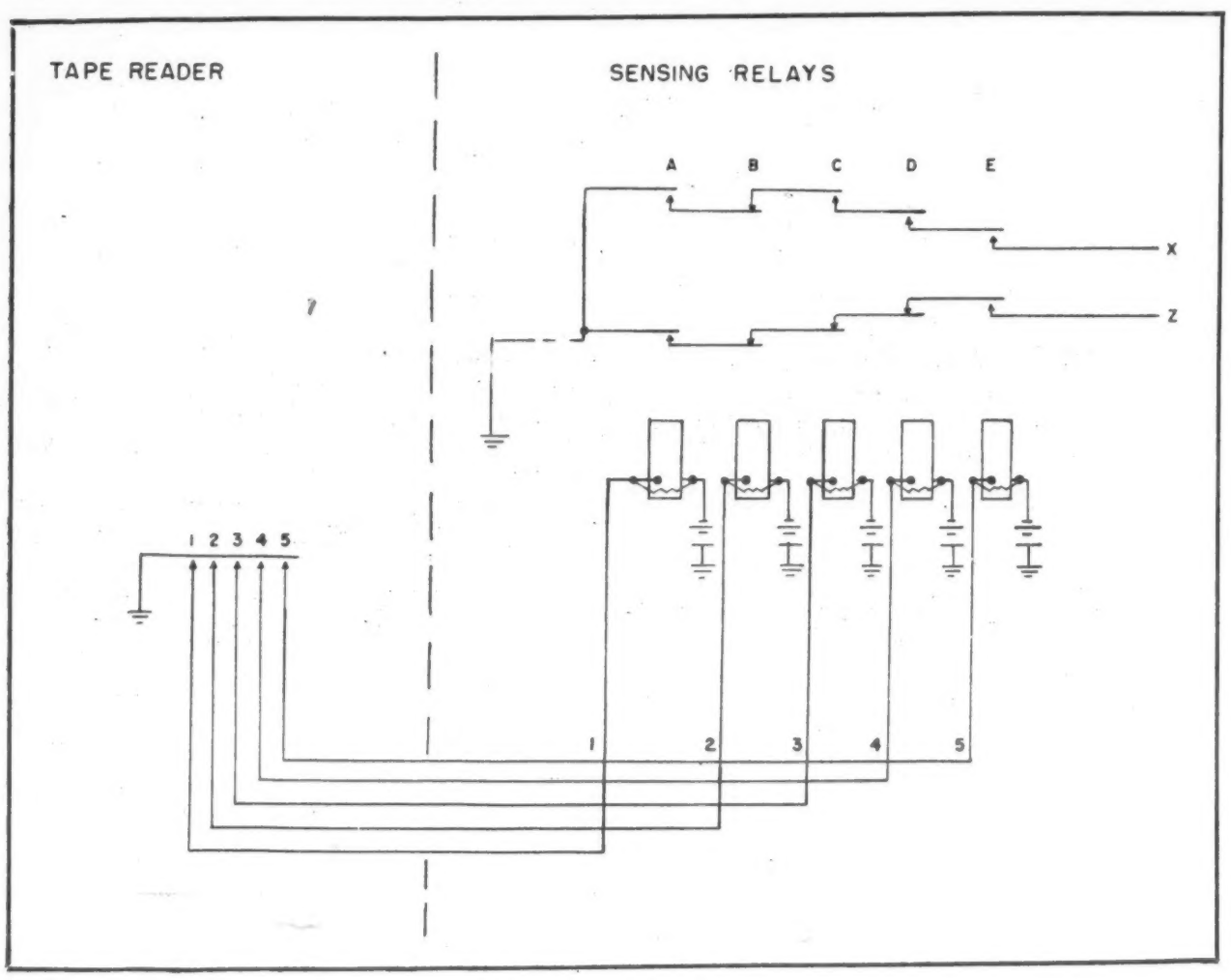
After the preliminary handling at incoming line unit, the Director causes the cross office selector switch to be positioned to a multiple call storage unit. As soon as the start-of-message indicator is detected in the multiple call storage unit, processing normally begins and is usually completed before the message is completely received.

When the first routing indicator for which the local switching center is responsible is detected, the routing translator returns an outgoing line number indication to Director-type components of the multiple call processing equipment. These Director-type components select a cross office unit from the same pool available to the normal Director and in the same manner previously described. For example, a cross office unit which is not busy receiving, which contains the same precedence as the multiple call message being processed and which is set to the correct outgoing line may be reused for storage of the processed multiple call message.

As subsequent routing indicators are detected an additional cross office unit is selected each time a new outgoing line indication is returned by the routing translator.

When all applicable routine indicators have been detected a message "pilot" (handling instructions) is transmitted to each cross office unit.

Figure 4. Partial schematic showing method of sensing teletypewriter characters X and Z.



An interesting design problem involved in this pilot transmission is posed by the fact that the pilot must often contain information which was not included on the tape originally received.

When all pilots have been completed, transmission of the message exactly as received is made simultaneously to all cross office units involved. The message headings now available in the cross office units may be considered as single call messages, i.e., each cross office unit makes a bid for the outgoing line in exactly the same manner previously described for single call messages.

It is important to note that the multiple call processing described under this situation can be completed and outward transmission from the cross office unit can start even before the message is completely received by the incoming line unit, the ultimate in tape-relay speed. It should also be noted that through the use of the cross office pool for both single call and processed multiple call messages, processing is not delayed due to non-availability of one or more of the outgoing lines and that the immediate availability of cross-office paths is insured.

Situation No. 6

A message containing a non-valid precedence indicator or routing indicator is being received.

Under either of these conditions the message is routed automatically to the intercept and forwarding unit. An attendant detaches the tape from the intercept unit, makes appropriate correction and places it in the forwarding unit. The forwarding unit is identical, electrically, to a cross office unit except that the determination of the outgoing line and precedence is made by the attendant rather than by the Director. Since transmission from the forwarding unit is made directly to the outgoing line rather than through rehandling by the Director, a saving in equipment and time is accomplished.

Other Features

An elaborate alarm system, both audible and visual, is provided to immediately inform attendants of abnormal equipment or traffic conditions.

Considering the complexity of the problem, the reader might assume that highly complicated circuitry is essential. To illustrate the fallacy of such an assumption when thinking in terms of individual circuits, a brief description of the method of detect-

(*Continued on page 78, col. 3*)

From the President

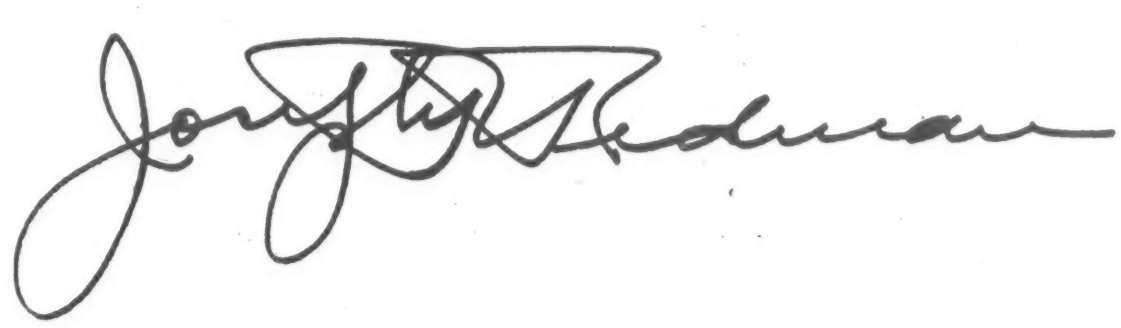
Our new national president, Admiral Joe Redman, takes over the leadership of the AFCA at a crucial time. His long and distinguished career both in the service and in industry makes him exceptionally well fitted to follow Wally Watts as president, and insures another progressive year for the Association.

In my first communication to the members of the AFCA, I wish to extend my praise to Wally Watts, Past President of our Association, for the splendid job he did. The organization has grown stronger both in membership and finance in the past year; however, we are a relatively young organization and much work must be done to heighten the AFCA's stature in its recognized fields of endeavor—communications, electronics and photography.

The Seventh Annual Convention held in Dayton was a grand success. It is too bad that all-hands could not have witnessed the great show put on by the Air Force at the Wright Air Development Center. The 3-D techniques displayed by the Reconnaissance Service were most interesting and brought out vividly the close relationship which exists between electronics and photography.

The tempo of present day life continues to be accelerated and developments in the realm of guided missiles indicate there is going to be less time in the future to initiate action in the field of military operations than there has been in the past. Human reflexes haven't changed enough to keep apace with the shortening time intervals achieved in the field of electronics. In fact, we find ourselves turning to the science of electronics for solutions to human problems. Maybe this science some day will replace man in future peace or war operations.

The relationship between the Military Services and Industry engaged in improving national welfare and strengthening our national defense in our respective fields has been good in the past, but we must look ahead to a future which will see even greater solidarity achieved by our efforts through our own Association.



Association Affairs

Boston AFCA Show Viewed by 60,000

A "Salute to the Armed Forces" was viewed by an estimated 60,000 persons during the week of May 4-9 when they thronged to the Jordan Marsh department store in Boston to see an exhibition of electronic and other military equipment, staged by the Boston chapter of the Armed Forces Communications Association.

Featured in the exhibition were two message centers which sent thousands of free messages to military personnel in the United States and abroad; an operating mobile filter center demonstrating the interception and destruction of enemy aircraft; "video phones" that allowed the users to see each other as well as hear each other; and many other operating electronic and communications equipment.

The exhibition opened with a review by ranking Armed Forces officers of the New England area accompanied by civic leaders and distinguished guests. They reviewed a parade featuring the Eastern Air Defense Force Band (a crack unit of 43 pieces) and Army, Navy, and Marine platoons, followed by the smart-stepping Dorchester Civil Air Patrol Squadron, the champion drill team in the Massachusetts area. This latter unit was also runner-up in Civil Air Patrol Region I, covering the New England States, New York, New Jersey, and Pennsylvania.

After the review, there was an exhibition drill by the Dorchester Squadron and a welcoming of the guests by Mr. Hannah. Then the ribbon across the entrance to the Exhibition Hall was cut, and the exhibition officially opened.

The guests watched a demonstration of Filter Center operation by Major H. J. Hurlburt and his assistants from the Manchester Filter Center, Northeastern District, 32nd Air Division. Then followed a luncheon given by Edward R. Mitton of Jordan Marsh Company.

During the week, demonstrations of old and new signal equipment were shown by Lieut. Colonel C. G. Henline and members of the Signal Corps contingent, and Major Hurlburt's group repeated the filter center demonstration to packed audiences twice a day.

On Thursday, the AFCA was host to the regional meeting of the American Ordnance Association, which had visited the exhibition approximately 400 strong, and was welcomed by officers of the Boston Chapter.

Equipment exhibits during the week included an "Alert America" display of radar equipment, including moving parts. It showed an attacking bomber coming in from the west coast, demonstrating how radar detects the planes and helps guide interceptors to the attack.

The recently-declassified NIKE was on display, giving the general public one of its first glimpses of this remote-controlled weapons project, a forerunner of "pushbutton warfare."

The Civil Air Patrol had a rescue display on exhibition, showing how a search is made for missing persons and surface craft off the coast. There was a display of transistors, newest and most exciting of basic discoveries in the electronics world; "Radiac Robert," the attention-getting robot that carries a radiac meter in his hand and quickly finds radioactive material hidden in the surrounding area.

Tactical communications equipment included a switchboard display, showing the great improvements and reduction of size achieved since World War II, and the sensational AN/PRC-6 hand-held two-way radio, Raytheon's tiny and amazingly powerful "wireless telephone."

One of the most popular displays was the "WAC Corporal" guided missile. This "weapon of tomorrow," already highly developed, consisted of a complete missile and a cutaway model, showing the interior construction. There was also a large movie screen with a continuously running movie that demonstrated the operation of the missile.

The Thermionic Corporation had a speech suppressor display. A model of the new and famed Atomic Artillery aroused considerable interest on the part of the crowds.

The exhibition closed on Saturday night, but the window displays remained throughout Armed Forces Week.

At the opening of the Boston Chapter's exhibit, a "Salute to the Armed Forces," the following members of the reviewing party were interviewed: Mr. Edward R. Mitton, President, Jordan Marsh; Captain W. R. Richards, Chief of Staff, First Coast Guard District; Rear Admiral John L. McCrea, Commandant, First Naval District; and Mr. Paul F. Hannah, President of the Boston Chapter.

NATIONAL AFCA OFFICERS

National officers of the Armed Forces Communications Association for the fiscal year 1953-54 are headed by Rear Admiral Joseph R. Redman, USN, Ret., who is at present a Vice President of Western Union Telegraph Company in Washington, D. C. Admiral Redman was president of the Washington Chapter of AFCA during the past fiscal year.

To assist the President, the following five vice presidents were elected to serve for one year:

1st VP — Rear Adm. William B. Ammon, Director of Naval Communications.

ASSOCIATION AFFAIRS

2nd VP — Maj. Gen. George I. Back, Chief Signal Officer of the Army,

3rd VP — Brig. Gen. Gordon A. Blake, Director of Air Force Communications,

4th VP—Vernon B. Bagnall, General Manager, Western Area LL Dept., AT&T Co..

5th VP — Ellery W. Stone, President of American Cable & Radio Corp.

Frank W. Wozencraft will continue his duty as Counsel for another year.

The Executive Committee chosen for the coming year is composed of: Joseph R. Redman; Rear Adm. W. B. Ammon; Maj. Gen. George I. Back; George W. Bailey, IRE; Brig. Gen. Gordon A. Blake; Harry A. Ehle, International Resistance Co.; Theodore S. Gary, Gary Services and Automatic Electric Co.; Frederick R. Lack, Western Electric Company; and W. W. Watts, RCA and last year's AFCA president.

Upon a motion by Mr. Lack in the meeting of the Board of Directors, the office of Executive Secretary was abolished and the office of Executive Vice President created. Colonel Geore P. Dixon was appointed to the offices of Executive Vice President. Secretary, and Treasurer for the fiscal year 1953-54.

Annual Awards

AFCA's annual awards at the service academies were won by Midshipman John Endlich and Cadet Max W. Noah. National President Joseph R. Redman presented the prize at Annapolis, and New York Chapter President Donald F. McClure made the presentation at West Point. (Photographs will appear in next issue.)

Medals were also presented to outstanding ROTC cadets at sixty colleges. The winners will be reported in the September-October SIGNAL.

PAST PRESIDENT PROMOTED

Election of W. Walter Watts, member and past president of the Armed Forces Communications Association, as Vice President in Charge of Technical Products of the RCA Victor Division, Radio Corporation of America, was announced recently by the RCA Victor Division of the Radio Corporation of America.

Mr. Watts joined RCA Victor after wartime service which included assignments in Philadelphia as Commanding Officer of the Signal Corps Distribution Agency and as a Signal Corps Procurement Director for which he was awarded the Legion of Merit.

In his new assignment, Mr. Watts will supervise the activities of both the Engineering Products Department and the Tube Department of the RCA Victor Division.

Mr. Theodore A. Smith, also a member of the AFCA, previously assistant manager of the Engineering Products Department, will assume the position of Vice President in Charge of the Engineering Products Department. formerly held by Mr. Watts.

New Assignment for Captain Hay

Captain Richard R. Hay, USN, former Head of Informational Services and the Reserve Liaison Section of the Division of Naval Communications, has recently been appointed Chief of Communications for the Supreme Allied Command, Atlantic.

During his tour of duty in Washington, Capt. Hay was the Contributing Editor of SIGNAL for Navy News. In this position, Capt. Hay took particular interest in the Amateur Radio Department of SIGNAL and supplied Navy news and information for that section.

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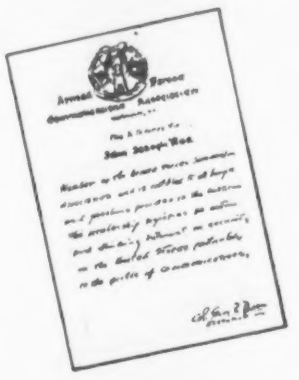
Component: Army ☐ — Navy ☐ — Air Force ☐ — Marines ☐ — Civilian ☐
Coast Guard ☐ — National Guard ☐ — Merchant Marine ☐

Branch: ..... Rank or Grade: .....

Type of Membership desired: Full—$5.00 ☐ Student—$2.00 ☐ Life—$100.00 ☐
I am a citizen of the U.S.A.. Enclosed find $ ..... for annual dues for AFCA membership, which includes subscription to the bi-monthly magazine SIGNAL.

DATE: ..... SIGNATURE: .....

AFCA Insignia



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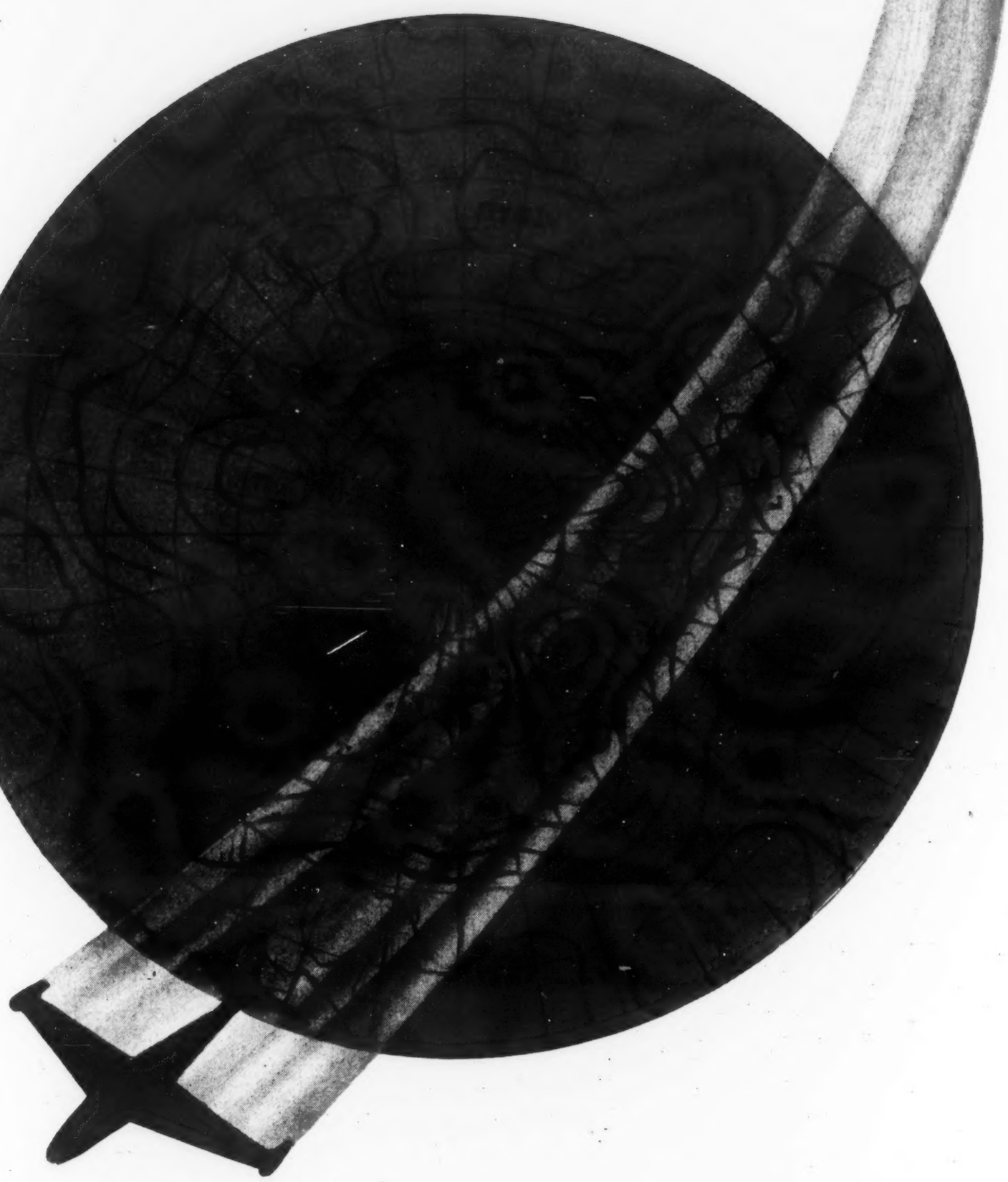

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Listed below are the firms who are group members of the Armed Forces Communications Association. By their membership they indicate their readiness for their share in industry's part in national security. Each firm nominates several of its key employees or officials for individual membership in AFCA, thus forming a group of the highest trained men in the electronics and photographic fields, available for advice and assistance to the armed services on research, development, manufacturing, procurement, and operation.

Acme Telectronix
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Cargo Packers Inc.
Carolina Telephone & Telegraph Co.
Central Radio and Television Schools
Chesapeake & Potomac Tel. Co.
Churchill Cabinet Co.
Cincinnati & Suburban Bell Tel. Co.
Collins Radio Company
Columbus Process Co., Inc.
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Corning Glass Works
Croname, Inc.
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De Vry Corporation
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Downing Crystal Company
Dukane Corporation
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Merit Transformer Corp.
Michigan Bell Telephone Company
Motorola, Inc.
Mountain States Tel. & Tel. Co.
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New Jersey Bell Telephone Company
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Sonotone Corporation
Soundscriber Corp.
Southern Bell Tel. & Tel. Co.
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Sperry Gyroscope Company
Sprague Electric Company
Stackpole Carbon Company
Standard Coil Products Co., Inc.
Standard Piezo Co.
Standard Transformer Corp.
Stewart-Warner Corporation
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Sylvania Electric Products, Inc.
Technicolor Motion Picture Corp.
Telephone Services, Inc.
Telephonics Corporation
Teletype Corporation
Times Facsimile Corporation
Transmitter Equipment Mfg. Co.
Trav-ler Radio Corp.
Triad Transformer Corp.
Tung-Sol Lamp Works, Inc.
United States Rubber Company
United Telephone Co.
Utah Radio Products Co., Inc.
Voltz Brothers, Inc.
Waterman Products Co., Inc.
Wells Sales, Inc.
West Coast Telephone Co.
Western Electric Company, Inc.
Western Union Telegraph Co.
Westinghouse Electric Corp.
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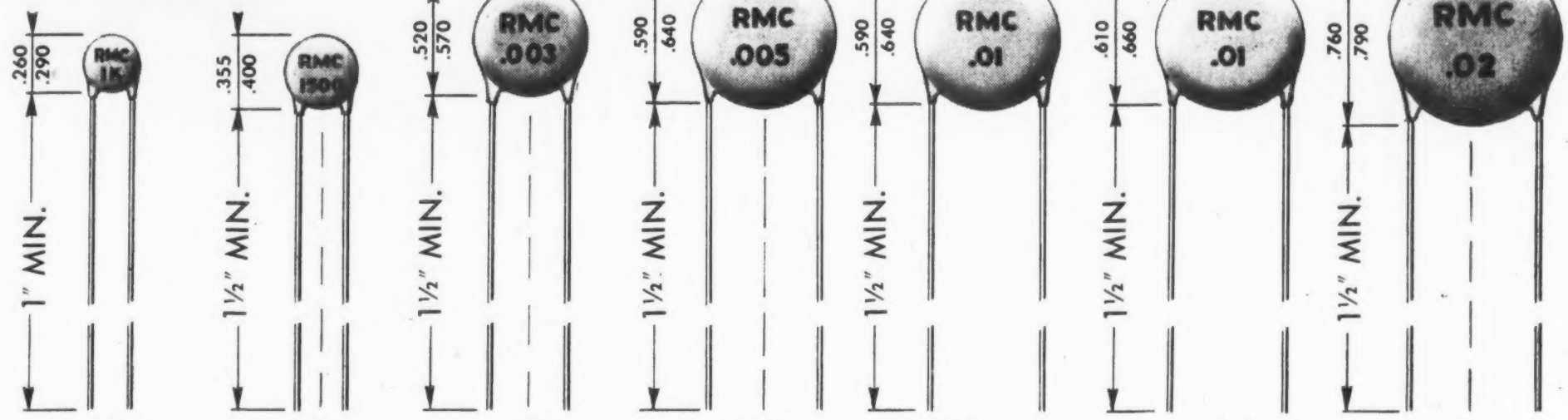

.00047	.0015	.003	.0047	.01*	.01*	.01
.00068	.002	.004*	.005	±20%	.02*	.02
.0008	2x.001	.005*	2x.002	.02*		2x.004
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TEST VOLTAGE (FLASH): 2000 V.D.C.
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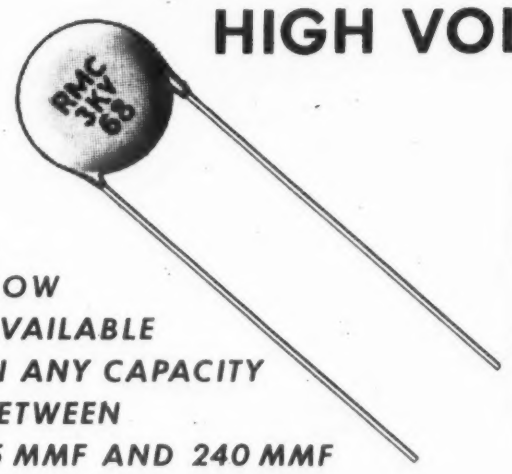

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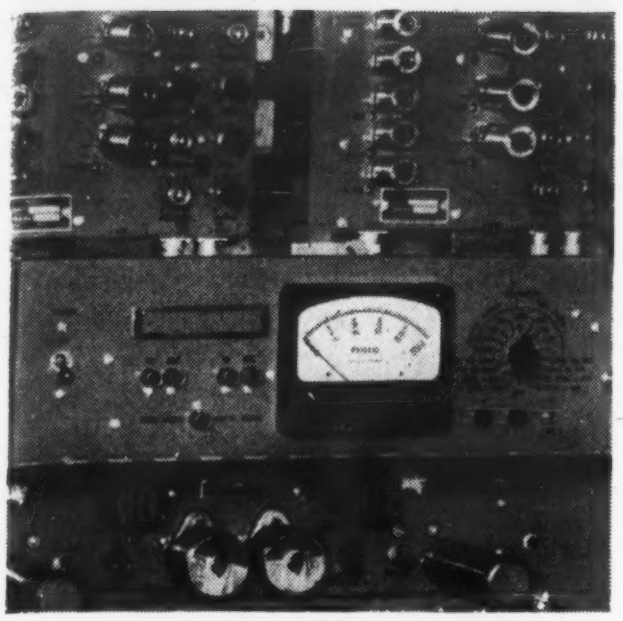

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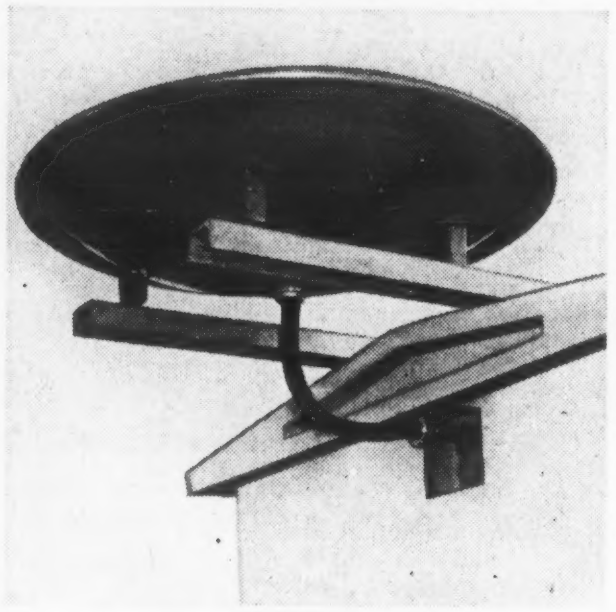

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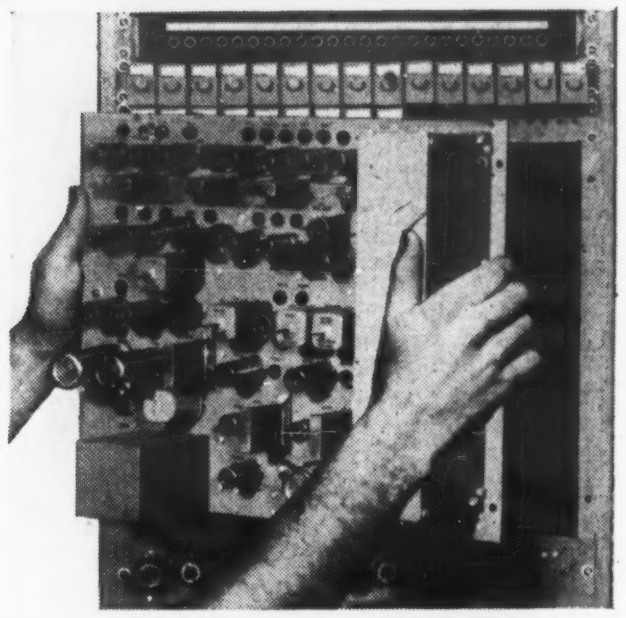

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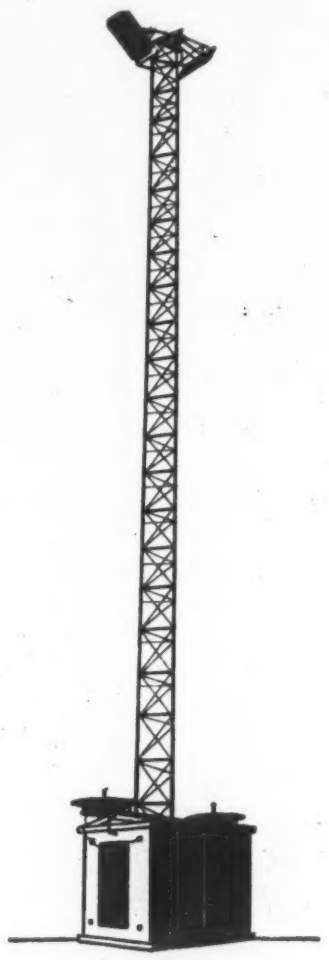

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Chapter News

1953 Chapter of the Year—Augusta-Camp Gordon

Atlanta

June 8th dinner-meeting which was addressed by Lt. Gen. A. R. Bolling, CG, Third Army. Shown at right are (l to r): Kelly Mosley, chapter president; General Bolling; and Fred J. Turner, president of Southern Bell T&T Co.

Atlanta

Lt. General A. R. Bolling, commanding general of the Third Army, was guest speaker at the chapter's quarterly dinner-meeting on June 8th. Emphasizing the importance of communications to the armed services, General Bolling endorsed the aims and objectives of the AFCA by saying, "I think it is of the utmost importance that members of industry and the armed services who work in the field of communications meet together on occasions such as this for fellowship and to discuss their mutual problems." The general was introduced by Fred J. Turner, president of the Southern Bell Telephone and Telegraph Company.

Held at the Fort McPherson Officers' Club, the dinner-meeting was preceded by a congenial social hour, with 150 members and guests present. An excellent program of entertainment was staged by the Third Army Floor Show, with feature performances by the "Wagon Masters," Don Meehan, George Rudolph and Faron Young.

Master of ceremonies was Kelly Mosley of Southern Bell, the new chapter president. Other chapter officers are: vice-presidents—Lt. Col. C. A. Butler, Fort McPherson; Jack Evans, Western Union; Robert J. Smith, Atlanta General Depot; and Robert C. Dancy, Georgia Tech.; secretary-treasurer—Richard L. Janss, Southern Bell.

Members of the board of directors are: Lt. Gen. Bolling; Lt. Col. P. R. Curry, Western Electric Co., past president of the chapter; Capt. Jesse Draper, USNR (ret.), Draper-Owens Co.; Lt. Gen. Alvan C. Gillem, Jr., USA (ret.), Georgia March of Dimes; M. G. Halligan, Western Union Telegraph Co.; W. L. Mullins, Stromberg-Carlson Co.; John M. Outler, Jr., WSB Radio Station and WSB-TV; John E. Ramsey, Philco Corp.; Fred J. Turner; Col. Blake R. Van Leer, Georgia Institute of Technology.

Committee chairmen have been appointed as follows: reception — Jack Evans; program — Col. D. A. McKeever, J. E. Hanger, Inc.; membership—Frank M. Malone, Southern Bell; publicity—Lt. Cdr. C. S. Thorp, USNR, Southern Bell.

Augusta-Camp Gordon

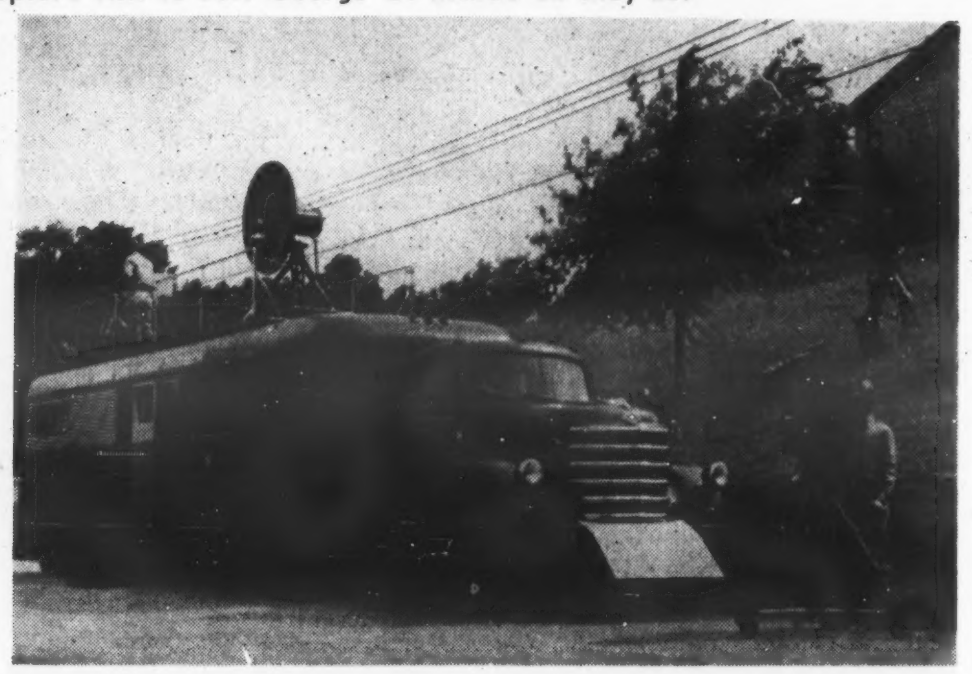
An unusually intimate view of the methods of televising "live" talent was the main attraction at the chapter's April 29th meeting which was held at Camp Gordon.

Talented entertainers from the post pooled their arts with the crafts of the lighting, camera and broadcasting technicians of the Signal Corps Training Center's television branch to produce a full hour variety show. Although strong on entertainment value, the show was produced principally so that the chapter members and guests could actually see the effects of different lens, angle shots and other generally unknown camera techniques.

Broadcast over a closed circuit from the Southeastern Signal School television studio to the Demonstration Building where the AFCA audience was gathered, the show was made up of six acts. Each act was preceded by a short explanation of the particular technique the cameraman would use and the problems the director and lighting technicians faced in producing it. A dance team provided an especially fine opportunity to demonstrate the effects of various sized lenses. The duo was shot first with a six inch lenses, showing only the dancers' hands; then with a four inch lens, and finally with a two inch which caught the full figures.

Following the show, the chapter visited the television studios where personnel of the Television Branch, SESS, and the entertainers who had appeared on the program, demonstrated the equipment used in the telecast.

Baltimore. Below, left, John A. Wilner, vice pres. in charge of Engineering, Hearst Corp., addresses April meeting. At right, the Signal Corps mobile television unit which featured the chapter's visit to Fort George G. Meade on May 23.



Xerography, Haloid's new dry process which uses electrostatic principle to make reproductions of letters, charts, drawings and offset master paper plates for office duplicating machines, was explained at the May 25th dinner-meeting by Mr. Davis, district manager of the Haloid Corporation. He also discussed several current and future developments and forecast new uses for the process.

Baltimore

Mr. John A. Wilner, vice president in charge of engineering, the Hearst Corporation, was guest speaker at the April 21st meeting. With "Why UHF and VHF" as his subject, Mr. Wilner told the story behind the recent FCC decision on "unfreezing" TV. During the four-year freeze the FCC engineers as well as television and radio engineers looked for a means whereby they could predict the interference among TV stations. Baltimore was given three channels out of a possible seven as it was determined that two channels could not be placed next to each other because the transmitters occupying channels next to each other could not operate properly. Mr. Wilner also informed the audience that the educational TV channels proposed in Baltimore will be on the UHF band. Baltimore is earmarked for three UHF channels and Washington for four.

In introducing the guest speaker, Program Chairman Arnold Wilkes pointed out that Mr. Wilner was a pioneer of CONELRAD in the Baltimore area. CONELRAD is the system whivh provides that, in case of enemy attack, all radio and television stations will go on the same frequency bands so that enemy planes would be unable to determine their locations by radio beam. Baltimore will have six participating stations — three at 640kc(TV) and three at 1240kc(radio).

The dinner-meeting was held at Mullineaux's Restaurant in Catonsville. Emmett Loane of the Chesapeake & Potomac Telephone Co. was appointed chairman of the nominating committee for the annual election of chapter officers.

Chapter members and guests attended a Signal Corps demonstration at Fort George G. Meade on May 23rd with the five-van mobile television unit highlighting the day's program.

Among the various pieces of equipment explained and demonstrated were the latest teletype machines and transmitters and the facsimile machine.

A Hiller helicopter was on display on the field and AFCA members were interested in observing its take-offs and landings. A single-engine reconnaissance plane was also on display.

Boston

"Communications for Air Defense" was the theme of the chapter's May 28th meeting at the Boston Naval Shipyard in Charlestown, with George B. Larkin, assistant military communications manager of the Long Lines Department, A.T.&T. Co., as guest speaker.

During the business session which followed dinner, the chapter extended a vote of thanks to the Jordan Marsh Company for its superb cooperation and assistance during the recent Armed Forces exhibit; to Captain P. D. Gold, Jr., commanding officer, Boston Naval Shipyard, for hospitality during the past year; and to Paul F. Hannah for his outstanding service as 1952-53 chapter president.

Mr. Larkin discussed dispersion of facilities, almost instantaneous alternate routes of wire communications, air defense intelligence and command networks, civil defense wire communications, and line load control during and after air attack. Robert W. Holmes of the New England Telephone and Telegraph Co. supplemented the talk with a demonstration of the "Bell and Lights" air warning system. using a display panel entitled "Guarding Your City."

The annual election of officers was held with the following result: president—Raymond B. Meader, New England Tel and Tel Co.; vice-presidents—David R. Hull, Raytheon Manufacturing Co., and Brackett K. Thorogood, Franklin Technical Institute; treasurer—Alfred R. Taylor, Ultrasonic Corp.; secretary—Louis J. Dunham, Jr., Franklin Technical Institute; directors—Gardiner Greene, Gabriel Co.; C. C. Hornbostel, National Co., Inc.; Paul F. Hannah, Raytheon Manufacturing Co.; and T. F. Halloran, Baird Associates, Inc.

Committee chairmen are: program—Mac R. Bougere, RCA Victor Div.; reception—William Holdich, Boston Naval Shipyard; membership—Daniel Greene, New England representative for Triad Transformer Corp., Midland Mfg. Co., Air-Marine Motors, and Birtcher Corp.

Chicago

"Aeronautical Navigation by Radio" was the subject of a joint meeting of the AFCA Chicago Chapter and the Western Society of Engineers on April 17th, with C. A. Petry of Aeronautical Radio, Inc., as the main speaker.

Following the general meeting, members attended one of four special group meetings which were held on the following subjects: "Mechanical assembly of electronic components", conducted by S. C. Kolanowski, chief engineer, Stewart-Warner Corp.; "Analog computers", conducted by R. J. Medkeff, project engineer, Arkania Regulator Co.; "Clinical use of radioactive materials", by Dr. Lindonseed, director, Augustana and Oak Park Hospitals; and "Three-frequency mobile telephone system", by R. C. Romagne, Illinois Bell Telephone Co.

Stewart-Warner Electric was host to the chapter for its May 28th meeting. Members and guests were welcomed to the plant by Earl G. Fossum, general manager.

Talks were given by Stanley C. Kolanowski, chief engineer, on "The Mechanical Assembly of Electronic Components", and by John Howland, commercial sales manager, who discussed his company's contributions to the military-industry economy.

The chapter's annual elections were held with William C. DeVry, head of the DeVry Corporation, chosen as the new president. (Names of the other officers had not been reported to headquarters as SIGNAL went to press.)

Dayton-Wright

The chapter's April 23rd meeting was focused on 3-Dimensional photography, with Carl B. Balcomb, photographic engineer in charge of 3-Dimensional photography at Wright Field, as guest speaker.

Mr. Balcomb, who was one of the first to use projected 3-D pictures in the United States, presented a lecture-demonstration which ranked as one of the best programs ever given by the chapter. He also answered many questions concerning the recent innovation of 3-D in the motion picture industry.

Decatur

Photography was also stressed by the Decatur Chapter at its April meeting, with two films on photography, "Basic Portraiture Lighting" and "Hidden Gold", making up the program for the evening.

Public Relations Chairman James Buck reported on progress being made in organizing a chapter photography club. Referring to the club as a "school of learning by doing," he urged all members and guests to take an active interest in the project.

Interest was evidenced in holding a joint meeting with the Scott-St. Louis Chapter sometime during the summer, and chapter officers were asked to endeavor to make the necessary arrangements.

Detroit

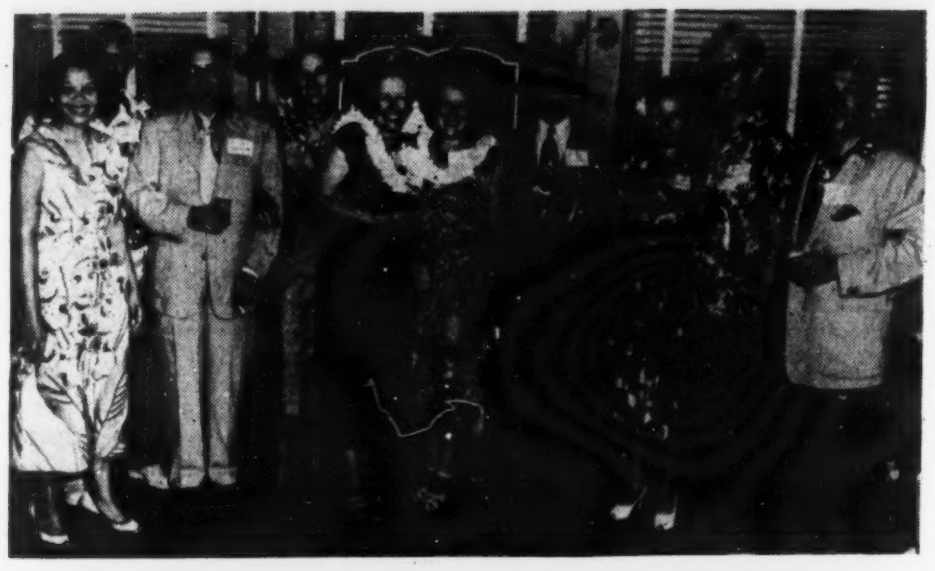
At its annual business meeting on May 7th, the chapter elected the following new officers for 1953-54: president—Leo J. Ritter, New York Central Railroad; vice-presidents—L. E. Zumsteg, Western Union: P. J. Schafer, Dept. of Street Railways; W. C. Edwards, Michigan Bell Telephone and Telegraph Co.; secretary—J. W. Ottinger, Michigan Bell; assistant secretary—F. A. DiPetto, Bendix Aviation Corp.; treasurer—W. N. Montgomery, Michigan Bell; assistant treasurer—F. Wilt. Motorola, Inc.

Memphis. Chapter members toured the transmitter plant of radio station WMC, the city's only television station, on May 16th.

Hawaii

AFCA's newest chapter celebrates its charter presentation.

Chapter officers (l to r): Jack Reed, treas.; Col. Arthur E. Mickelsen, president; Robert E. Dillon, secretary; Capt. Richard E. Elliott, 1st v.p.



L to r: Mrs. Bayless, Lt. Bayless, Lt. Cdr. Tourville, Mrs. Tourville, Mrs. Mickelsen, Mrs. Bucy, Lt. Col. Bucy, Mrs. Hazelwood, Maj. Hazelwood, Lt. Col. Berard.

Standing, l to r: Mrs. Kia, Mr. Evans, Mrs. Dillon, Mrs. Givens, Mrs. Thomas, Mrs. Wainer, Capt. Russell, Lt. Thomas, Mr. Givens, Mrs. Gilbert and Mr. Gilbert. Kneeling, l to r: Mr. Kia, Mrs. Wiser, Mr. Wiser, and Maj. Wainer.

L to r: Mrs. Ross, Maj. Wainer, Mrs. Posey, Mrs. Reed, Miss Atwater, Mrs. Lamboley, Lt. Cdr. Perry and Lt. Cdr. Griffith.

Fort Monmouth

One of the most complete and comprehensive descriptions of atomic weapons ever heard by the general public was presented by Maj. Thomas M. Rienzi in a speech delivered before the May 21st meeting of the Fort Monmouth Chapter.

Major Rienzi, who is presently assigned to the War Plans Division of the Army General Staff, showed the 250 AFCA members and their guests films of atomic explosions which had only recently been cleared for public showing. These color pictures showed atomic weapons being detonated in the air and under water.

In his talk, Major Rienzi pointed out how atomic explosions would affect the average home and other places of shelter. He described how such explosions look, feel and sound to the individual who finds himself nearby. He warned listeners that the best protection against atomic explosions is for the individual to get something between himself and the weapon being exploded.

Also shown during the talk were pictures of the Army's new atomic cannon.

A life member of the AFCA himself, Major Rienzi was introduced by Chapter President Joseph E. Heinrich as one of the outstanding military authorities in the field of atomic weapons. Maj. Gen. Kirke B. Lawton, Fort Monmouth commander, welcomed Major Rienzi to the post, and also gave the members a report on the recent AFCA national convention which he had attended in Dayton.

Two members who were leaving the post shortly and who have long been AFCA supporters were presented for an official farewell from the chapter. They were Brig. Gen. Edwin R. Petzing, commanding general of the Signal Corps Engineering Laboratories, and Lt. Col. Arthur L. Gaskill, post photographic officer.

Gulf Coast

The chapter's annual business meeting was held on May 11th, with the following slate of officers elected and installed: president — Lt. Col. Byron H. Gilmore; vice-presidents—Maj. James J. McMahon, Jr., Lt. Col. James L. Caselli and Thomas M. Ingling; secretary—Stanley G. Wagar; treasurer—George Grossnickle.

Hawaii

A festive occasion was the first regular meeting of the newly formed Hawaii Chapter. Held at the Pearl Harbor Commissioned Officers' Mess on May 1st, the highlight of the evening was a colorful ceremony in which the official chapter charter, lei-festooned, was presented to the membership by the officers of the chapter.

In an authentic South Pacific setting, with many of the members dressed in informal but colorful Island attire, there was dancing under the stars topped off with an all-Polynesian floor show featuring the exotic dances of Samoa and Tahiti. Particularly impressive were the Samoan sword dance and the Tahitian hula.

Those present included members of the Army, Navy and Air Force communication agencies in the islands, the State Department, Mutual Telephone Company, Automatic Electric Company, Western Electric, the CAA and local amateurs.

Following the charter presentation, the newly elected officers were introduced and congratulated. They are: president—Col. A. E. Mickelsen, signal officer, USARPAC: 1st vice-president — Capt. R. E. Elliott,

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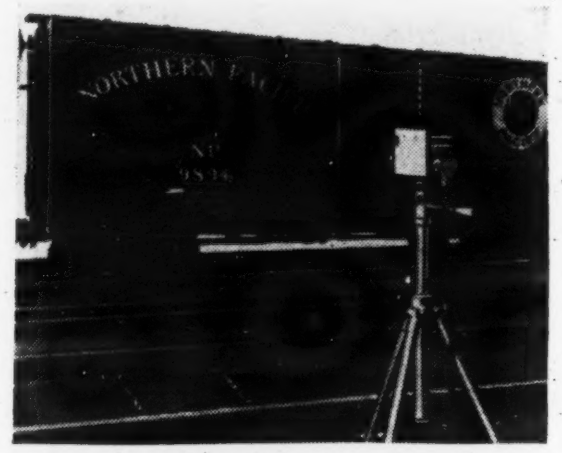
RCA "TV Eye" gives schools a private TV network, takes talks and demonstrations to classrooms.

Tireless "TV Eye"

New RCA TV camera an alert watchman for home, school, industry



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RCA vidicon camera in a bank, lets tellers verify the signatures on checks by television.

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"TV Eye" plugs easily into standard TV sets. You just switch to the selected channel, and see everything that the camera sees.

RCA® RADIO CORPORATION OF AMERICA

World leader in radio—first in television

Kansas City. Shown at left are new chapter officers and directors (l to r): C. L. Foster, Ruby D. Garrett, Carl L. Spaid, C. L. Buell, Glenn Rider, Col. C. E. McBrayer, R. E. Conrath and C. K. Hanley. At right, members examine the 3-D colored slides used in the program feature. L to r: Mrs. McBrayer; Col. McBrayer; Mrs. Anspach; R. J. Anspach, guest speaker; F. R. McFarland.

USN, district communications officer, 14th Naval District; 2nd vice-president—Lt. Col. R. F. Bowker, USAF, communications officer, Pacific Division, MATS; secretary—R. E. Dillon, USARPAC signal depot and service group; treasurer—J. R. Reed, sales engineer, Automatic Electric Sales Corp.

The delightful meeting, decorations and entertainment were arranged by the newly appointed program committee which is as follows: Lt. Col. Lowrey Moore, CINCPAC Staff; Lt. Cdr. J. T. Bedsole, Navy Communications Station, Pearl Harbor; William E. Alexander, Mutual Telephone Company; and Maj. J. W. Browning, ASA Hawaii.

Kansas City

Some fifty members and guests enjoyed a fried chicken dinner at the Wishbone Restaurant on May 6th, and then donned poloroid viewers for a program which featured three-dimensional colored slides taken by R. J. Anspach of the American Telephone and Telegraph Company on a vacation trip through the Grand Canyon. The natural beauty of the slides awed most of the audience which was enthusiastic in its response to the program.

During the business meeting new officers and directors were elected as follows: president—Robert E. Conrath, A.T.&T. Co.; vice presidents—C. L. Foster, Central Radio and Television Schools, and Col. C. E. McBrayer, director, communications-electronics, CADF; secretary-treasurer—Clark K. Hanley, A.T.&T. Co.; directors—C. L. Buell, Western Union Telegraph Co.; Col. Ruby D. Garrett, attorney; Cornelius Ashley, Southwestern Bell Telephone Co.; Glenn Rider, Rider-Philpott Studio; and Carl L. Spaid, United Telephone Co.

The newly elected officers and directors held a luncheon meeting on May 28th at which committees were set up and a tentative program scheduled for the coming year.

Kentucky

The chapter's June 10th meeting at the Lexington Signal Depot was addressed by S. H. Schapiro, general manager of the Sutton Electronics Company, Lexington, which manufactures converters, boosters and tuner assemblies.

Mr. Schapiro discussed television from the viewpoint of the average non-technical individual. His treatment of the subject proved to be very interesting and informative for the 123 members and guests present.

Louisiana

The chapter's April 14th meeting was in the form of a round table discussion, with William H. Mansfield, AFCA national director, as the principal speaker. Mr. Mansfield outlined the aims and purposes of the association and offered several constructive suggestions for the future growth of the Louisiana Chapter.

A general discussion period followed the talk, with numerous members participating. Dr. Joseph Morris, Ph.D., executive vice-president and head of the department of physics of Tulane University, stated that the AFCA had been of much help to the university and that some of the past programs had been of great value to his students. Chief Engineer J. D. Bloom of Radio Station WWL started a discussion as to whether or not technical men or the program and commercial men of the radio and television industry would be of greater value to the chapter. The concensus of opinion was that it was entirely up to the individual and not his business or profession.

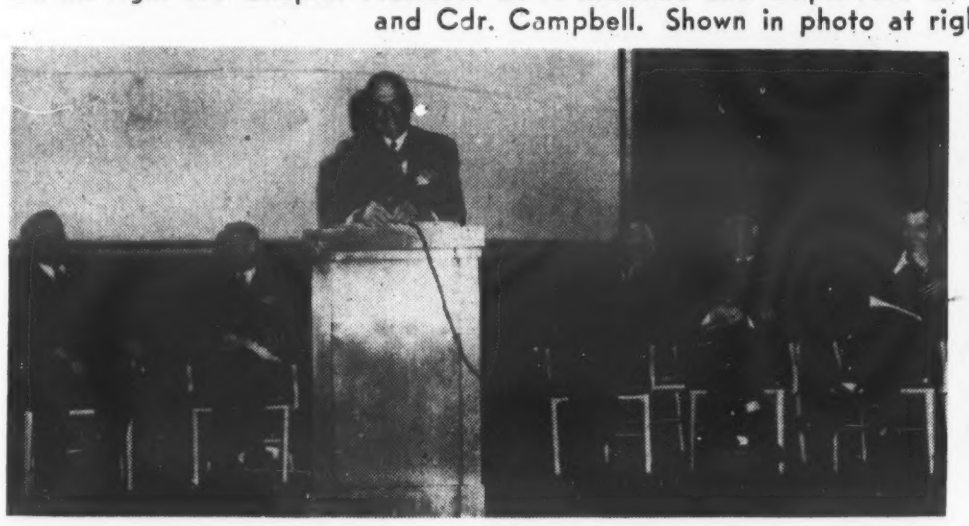
Dr. George Mayoral, Ph.D., engineer of the General Electric Company and executive vice president of the Supreme Broadcasting Company (WJMR-TV), who had recently returned from a prolonged stay in New York State, gave an interesting report on AFCA chapter meetings he had attended in that area. Cdr. John D. Rooney, district communications officer, 8th Naval District, touched on the value of personal contacts obtained from an organization such as the AFCA. Rev. Father Francis Benedetto, professor of physics at Loyola University, commented that the closer the AFCA worked with his students the better these students would fit into national defense. Wallace M. McCormick, area engineer for Western Union Telegraph Company, stressed the importance of close coordination with Civil Defense.

Chapter programs came in for considerable discussion. Thomas Taylor, sales manager of Western Union, stated that the strength of an organization was dependent on the quality of its programs, and agreed to arrange a program featuring the new services of his company. John E. Hurley, officer and director of Offshore Navigation, Overseas Navigation and Offshore Raydist, also agreed to furnish an interesting lecture-demonstration for a future meeting.

The meeting was held in the board room of the Greater New Orleans Chamber of Commerce and was presided over by Chapter President C. C. Walther. Other members present included B. F. Hatfield and C. A. Von Hoene of the Southern Bell Telephone and Telegraph Co.; L. N. Smith, Western Electric Co.; Mercer Reynolds, U. S. Coast Guard; Letcher J. Lampkin, U. S. Navy; Cdr. Allen, Coast Guard; and Chapter Secretary A. B. Hay, Southern Bell Tel and Tel Co.

The program for the June 9th meeting was provided by the Western Union Tele-

New York. At left, Rear Adm. C. L. Austin, CO, Naval Supply Corps School, addresses April meeting aboard aircraft carrier U.S.S. WASP. On his right are Chapter President D. F. McClure and Capt. Paul C. Crosley; on his left, Capt. R. Sperry Clarke, Capt. W. W. Johnson and Cdr. Campbell. Shown in photo at right is the chapter's May 27 meeting at IBM.



aph Company, with W. M. McCormick, area engineer, as guest speaker.

Mr. McCormick traced the history of Western Union, which is celebrating its 100th anniversary, and covered the many improvements over the years until today when there are fifteen high speed message centers insuring speedy service to any part of the country. He also pointed out that in 1949 Western Union completed a program of mechanization which cost approximately $100,000,000 and which eliminated sources of human error.

The relationship of the telegraph industry to civil defense was briefly described by F. M. Thomas, coordinator for civil defense for the New Orleans area of Western Union.

A motion picture was also shown highlighting some of the important phases in the history of the company, after which the members moved over to the Western Union Building where they were shown through the company's high speed message center.

The Engineers' Club in the De Soto Hotel was the scene of the meeting with forty-two members present, with Vice-President Charles Pearson, Jr., presiding.

Memphis

Radio Station WMC was host to the chapter at its transmitter plant on May 16th. Following a buffet supper which was provided by courtesy of the hosts, the members were conducted on a tour of the plant by Chapter President E. C. Frase, Jr., who is chief engineer of the station. The tour was especially interesting since the station operates a 10 KW AM, a 50 KW FM, and the city's only TV transmitter.

New York

The aircraft carrier *U.S.S. WASP*, at its berth in the New York Naval Shipyard, Brooklyn, was the site of the chapter's April 22nd meeting which drew a record attendance of 429 members and guests.

A most interesting tour of the ship was followed by dinner in the general mess. The members and guests then gathered on the hangar deck where Capt. Paul C. Crosley, communications officer of the Eastern Sea Frontier and the Navy member of the chapter's armed forces committee, presented Capt. R. Sperry Clarke, commanding officer of the *WASP* who welcomed the chapter aboard; Capt. W. W. Johnson, representing Admiral Cowdrey, commander of the shipyard; and Cdr. Campbell, executive officer of the *WASP*.

The speaker of the evening was Rear Admiral Charles L. Austin, commanding officer of the Naval Supply Corps School, Bayonne, N. J., who gave an interesting talk on the subject of the school and discussed some of the fields of research and development being studied there.

Two films on the Pacific Sea Frontier and the Atlantic Sea Frontier concluded the evening's program.

The International Business Machines Corporation, a group member of the association, was host to the New York Chapter on May 27th.

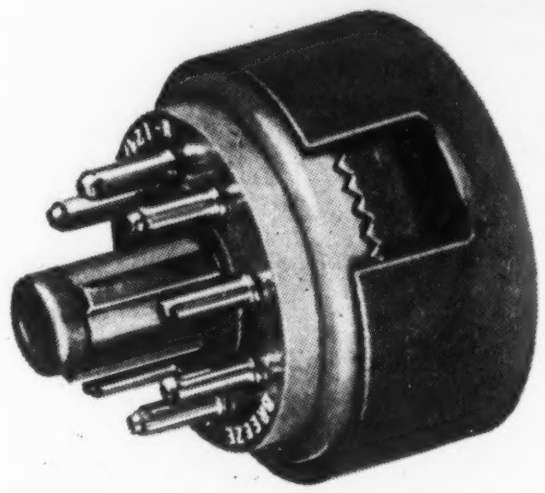
Dr. Cuthbert Hurd, director of the applied science division of IBM, welcomed the members and their guests and gave an outline of the general activities of the company. Dr. Truman Hunter, technical specialist of IBM, was the principal speaker and presented an excellent story of the history and current developments in the electronic data processing equipment field.

The members were given a demonstra-

RUGGED as a RHINO ... Quick as a Fox!

Two Special Purpose Connectors by

BREEZE MARK



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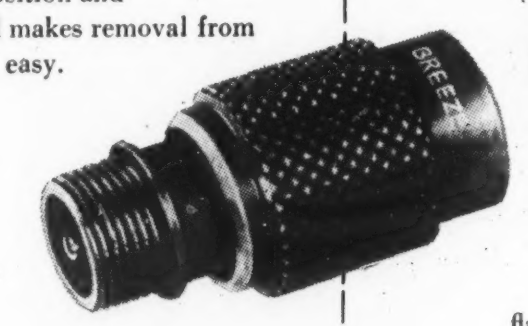
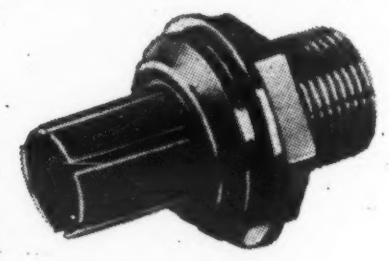
8-pin type for both A and B batteries used in all types of field communication equipment. "RUGGEDIZED" for extra security and long service life: polarizing stud is ALL METAL and all metal parts are cadmium plated and sealed with an iridite sealer. Cable may be brought out at any desired side position and locked. Handy bail makes removal from inaccessible places easy.

Quick Disconnect

Simply push male and female members together and lock. To disconnect with minimum resistance, pull back sleeve on plug shell and disconnect. Exceptionally low disengaging force required (less than 6 lbs., excepting pin friction). Vibration proof, moisture-proofed with synthetic rubber insert. Meets AN pin pattern and voltage requirements, in accordance with MIL C-5015. Plug shell and coupling sleeve are aluminum alloy, cadmium plated and iridite-sealed. (Federal Spec. QQP – 416, Type 2.)





Receptacle Types: Round flange single hole panel-mounted, square flange for 4 bolts, or specially flanged to specification. All contacts silver plated.

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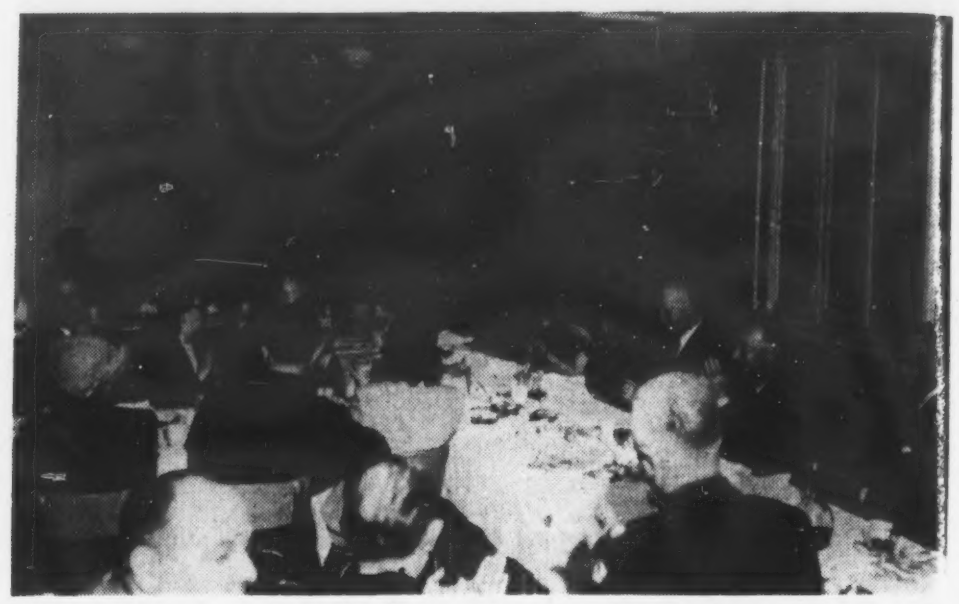


Paris. During his recent trip to Europe, W. W. Watts, then national AFCA president, visited the Paris Chapter. He is shown at left with John T. Quinn, chapter president. The chapter's May meeting featured a tour of SHAPE communications facilities. Scene at right is of the dinner which preceded the tour.

tion of the "701" electronic data processing machine, newest and most advanced of electronic "brains" which performs more than 16,000 arithmetical operations per second and utilizes such new memory devices as cathode ray tubes, magnetic drums and magnetic tape. A twenty-minute color motion picture, "Piercing the Unknown", illustrating major scientific advances made possible by data processing machines, was shown.

Two hundred members and guests attended the meeting and the dinner which preceded it in the company cafeteria. Chapter President Donald F. McClure presided and announced preliminary details of the June meeting to be held at Governor's Island. Col. Benjamin H. Oliver, chairman of the membership committee, reported on the committee's activities and noted that as of May 27th chapter membership stood at 999.

Paris

The fourth meeting of the Paris Chapter was held on May 12th at SHAPE headquarters, with 148 members, ladies and guests present for a social hour and dinner.

Chapter President John T. Quinn complimented the chapter on the excellent turnout. He expressed particular pleasure that many of the officers attending the short course for staff signal officers of major commands and NATO nations, being conducted by Signal Division, SHAPE, had accepted the invitation to attend the meeting as guests.

Lt. Col. John J. Fettig, headquarters signal officer, SHAPE, the principal speaker, was introduced by Col. Raymond Strasburger of Allied Air Forces Central Europe. Col. Fettig described the SHAPE communications facilities and concluded with a conducted tour of the SHAPE communication center and the SHAPE telephone exchange.

Plans for the next meeting to be held at Fontainebleau were announced by Col. G. H. Palmer, chairman of the program committee.

Philadelphia

Philadelphia Chapter members and guests witnessed a fast-moving schedule of activities on a plant tour May 21st at the famous Piasecki Helicopter Corporation, Morton, Pa.

Armed with attractive brochures covering the history, description and photographs of the various helicopter models made by the Piasecki Corporation, the members and guests split into small, guided groups and started their inspection tour of static helicopters on the flight ramp of the modern, one-story plant. From there, Piasecki helicopters were viewed in various sub-assembly stages throughout the plant. Following lunch in the company cafeteria, Chapter President R. G. Swift introduced the host for the afternoon's well-planned program, Col. D. L. Rundquist, USAF, commanding officer, Air Forces procurement district, and chapter vice-president, who gave an introductory address.

Introductions by Cdr. Eric A. Lohman, USN, Bureau of Aeronautics' representative, and Harry S. Pack, customer relations' vice-president of the Piasecki Corporation, were followed by a brief description of the company's history and products, supplemented with a movie film, by H. S. Tremper, manager, military liaison department. Mr. Tremper reviewed the rapid progress of the helicopter from the first single seater developed by Frank Piasecki on April 11, 1943, right through to the anticipated 40-passenger commercial transport now under development in the Morton plant. Today, there are both 12- and 20-passenger helicopters in production, the larger type capable of picking up more than two tons and cruising at 125 miles per hour.

In addition to their well-known use in rescue missions, applications of "rotary wing aircraft" to military communications problems were discussed by F. K. MacMahon, Piasecki's military liaison administrator. He cited radar calibration, submarine warfare, surveillance of otherwise inaccessible locations and the setting up of communications equipment in these areas, laying spiral cables and poles, and placing UHF-VHF transmitters on high locations. The possibility of helicopters acting as advance TV transmitter stations is now under investigation.

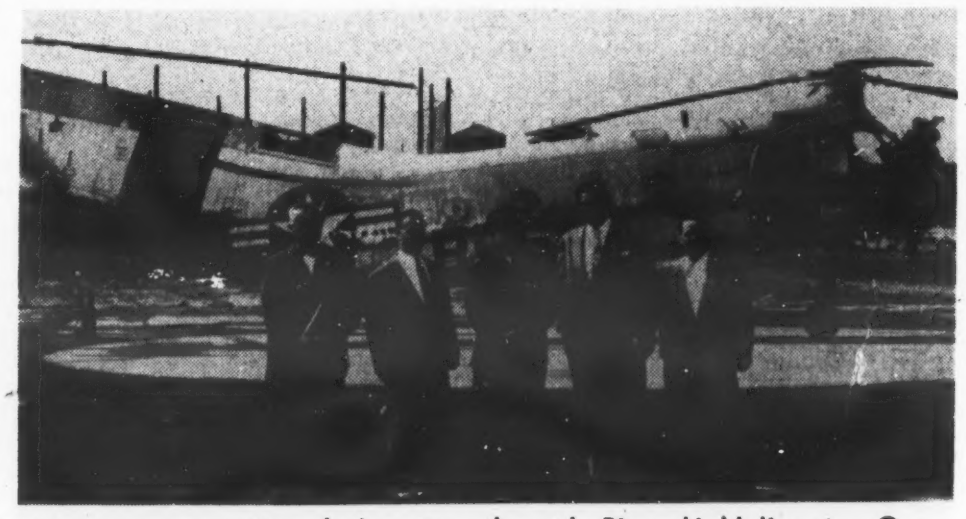
The program concluded with impressive flight test operations including a rescue demonstration on the flight ramp outside the plant.

Pittsburgh

An inspection trip through the Pittsburgh Terminal of the Pennsylvania Railroad Company, arranged through the courtesy of A. M. Crawford, supervisor of communications, featured the chapter's May 26th meeting.

Assembling in the conference room of the terminal, the chapter was welcomed by M. S. Smith, general manager of the Pennsylvania Railroad. After a briefing on the type of inspection trip to follow, the group was divided into small units to ensure an efficient and informative tour.

First was a trip through the "Pittsburgher", a famous New York-Pittsburgh train. Although most of the members had ridden this train on many occasions, they were surprised at how little they had



Philadelphia. Chapter members, left, watch Tandem Helicopter demonstrate rescue operation during tour through Piasecki Helicopter Corp. plant on May 21st. Taking time out from their inspection tour of static helicopters on Piasecki's flight ramp, at right, are chapter officers (l to r): A. S. Hawthorn, Col. R. G. Swift, Col. D. L. Rundquist, J. D. McLean and Victor K. Cohen.

known about its make-up, its signalling system and the roadbed on which it travels.

One of the latest types of Diesel locomotives was inspected, with the guides pointing out that the Pennsylvania Railroad has more Diesel locomotives than any other railroad in the world. Each train locomotive is equipped with train phone, cab signals and speed controls.

The cabin car was next on the program. It included the trainphone, a two-way, two-channel FM inductive train communication which is a private road telephone system for exclusive use of block operators in towers and trainmen. When one channel is in use the loudspeaker is always connected to the other channel for immediate emergency reception. High channel operates on 144 KC and low channel on 80 KC.

A visit to the Pitt block and interlocking station, the world's largest, was of considerable interest. The control room has 367 lever interlocking machine controls, 308 switches, and 202 signals. Associated with the machine is the light indication board above it on which all trains automatically pin-point their location by miniature lamps for the benefit of the operating personnel.

The ticket sales and service bureau was also visited and members saw centralized sales activities of several groups handling tickets, reservations and information, in modernistic quarters. Designed to simplify and speed the procurement of space and tickets by patrons of the railroad, it is the first of its type in the nation. The installation utilizes the latest teletype, Western Union Telefax and Bell Telephone No. 4 order board equipment.

The last stop on the tour was the "GO" telegraph office which is the message center for the entire Central Region of the Pennsylvania Railroad. The outstanding feature of this office is a four-position teletype switchboard.

There were ninety-four members and guests present, and the program was pronounced one of the best ever staged by the chapter.

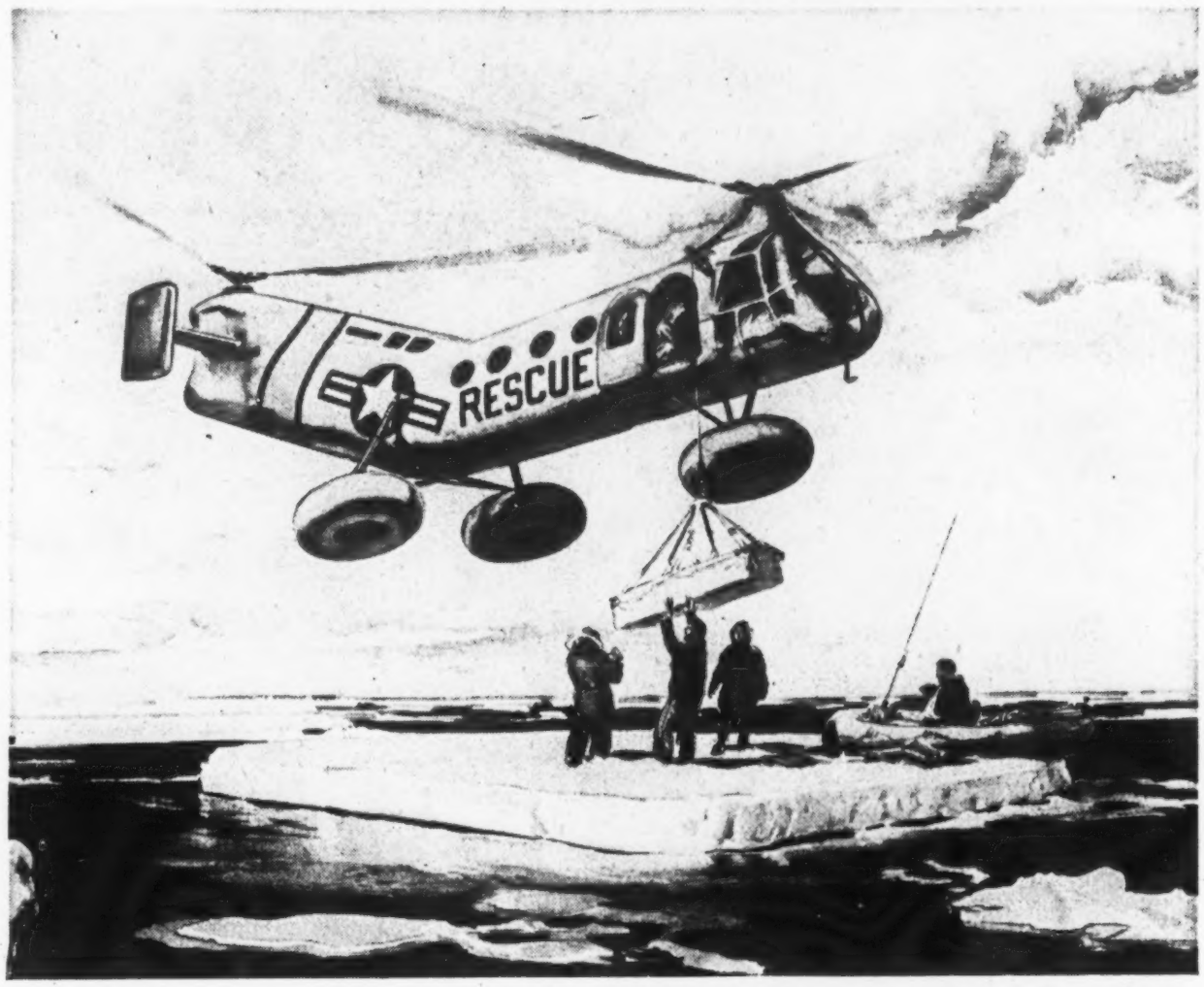
The recent annual elections brought in the following new slate of officers for 1953-54: president—S. E. Phillips, Bell Telephone Company of Pennsylvania; vice-presidents—W. W. Ege, Copperweld Steel Co.; E. W. Breisch, Union Switch & Signal Co.; H. W. Mitchell, Bell Telephone Co.; Maj. E. G. Williamson, Carnegie Tech; treasurer—W. H. Yates, Western Union Telegraph Co.; secretary—Harry W. Shepard, Jr., Stanwix Companies. Directors are: G. E. Aderhold, Saxonburg Potteries; A. N. Galone, Bell Telephone Co.; F. E. Leib, Copperweld Steel Co.; F. E. Moran, Western Union Telegraph Co.; E. J. Staubitz, consulting engineer; W. C. St. Clair, Bell Telephone Co.; S. H. Stupakoff, Stupakoff Ceramic and Manufacturing Co. Executive committee member—Ralph Will, retiring president.

Sacramento

Major K. R. Stow, principal speaker at the chapter's April 14th meeting, discussed "Radar Bombing" and covered the principles of radar, radar systems and their costs, training of operators, and the interpretation and use of data obtained from radar systems. A film on radar bombing, demonstrating simulated radar bombing attacks on Stockton and Los Angeles, was shown at the conclusion of Major Stow's talk.

The meeting was held at the Officers' Club of Mather Air Force Base. Major Michael Stublarec, wing operations officer,

The PROTECTION of ALUMINUM



Drawing courtesy of Piasecki Helicopter Corporation, Morton, Pennsylvania

THE H-21 Piasecki Tandem Helicopter—the "Work Horse"—is ideally suited for rescue work in areas inaccessible by other means, and in all kinds of rough weather.

For durable paint adhesion and high corrosion-resistance aluminum parts of the "Work Horse" are Alodized. The "Alodine" protective coating chemical bonds paint, extends paint life, and protects unpainted aluminum.

Because of its economy, effectiveness, and ease of application, the Alodizing process is finding wide-spread use in the aircraft field and in other industries fabricating products of aluminum.

Alodized aluminum meets the requirements of Military Specification MIL-C-5541. Write or call for coating and process data on "Alodine".

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San Luis Obispo. April meeting was addressed by Col. Lloyd C. Parsons, president of San Francisco Chapter. L to r: George Humphreys, Lt. Col. Jack Warner, Samuel H. Boyd, Lt. Col. Carl H. Sturies, Col. Parsons, William H. Angel and Guinard H. Rydell.

made arrangements for the program.

Some 500 people, including AFCA members and guests, camera bugs and amateur photographers, witnessed the latest methods of color printing at the May 19th chapter meeting at McClellan Air Force Base.

James Doty, sales manager for the Ansco Corporation, and Sam Wilkins of the Royal Chrome Corporation from San Francisco gave a joint demonstration showing the latest methods and techniques used in color printing.

San Francisco

Coordinating with the May-June issue of SIGNAL, the May 28th meeting of the San Francisco Chapter was devoted to the subject of photography and was held jointly with the Northern California Photographers' Association. The meeting, preceded by a social hour and dinner, took place at the Officers' Club of the San Francisco Naval Shipyard at Hunter's Point, with 156 members, wives and guests present.

AFCA Chapter President Lloyd C. Parsons presided and introduced Capt. A. M. Zollars who welcomed the members and guests of both associations on behalf of Capt. W. L. Turney, commander of the shipyard. President Robert Skelton of the Northern California Photographers' Association was introduced and presented the other officers of his association.

Maj. Gordon A. Stevens of the Eastman Kodak Company, special program chairman for the occasion, explained the photographic exhibits on display which had been furnished through the courtesy of the following organizations: RCA Communications; pictorial section, Sixth Army Signal Corps; photo interpretation section, Alameda Naval Air Station; photographic section, San Francisco Naval Shipyard; and the Stanford Research Institute.

After a thirty-minute intermission during which members and guests inspected the photographic exhibits, two motion pictures were shown. The first, "Industrial Uses of Photography" was provided by the Eastman Kodak Company and described micro-photography, time-lapse photography and micro-filming techniques, and other various uses of photographic materials and techniques in industry. The second picture, entitled "The Combat Photographer", was loaned by the Signal Corps and depicted the history and present uses of photography in combat.

Arrangements for the outstanding meeting were made by Maj. Thomas D. Razovich of Radio Station KFRC and Major Stevens.

San Luis Obispo

Col. Lloyd C. Parsons, San Francisco Chapter President, was guest speaker at the April 23rd meeting of the San Luis Obispo Chapter. With "After Stalin, What?" as his subject, Col. Parsons analyzed the background and make-up of the present Russian government, including an individual history of the current members of the Soviet hierarchy. He concluded his talk with several predictions of world events.

Also guest of the chapter was Lt. Col. Jack Warner of Warner Bros. Studio, Hollywood, who was on two weeks' active duty at Camp San Luis Obispo.

A buffet supper preceded the meeting at the Officers' Club, with fifty members and guests present. During the business session, the chapter constitution and by-laws were officially adopted.

Scott-St. Louis

The April 10th chapter meeting paid tribute to the Ground Observer Corps and the Air Defense Command and their individual and joint contributions toward the defense of the United States.

The program was conducted by Capt. Roy Meyer and Capt. William Beckwith of the 798th AC&W Squadron and Lt. Maurice Turner and M/Sgt. Elliott Crane of the 4781st Ground Observer Squadron and the Springfield Filter Center of the Ground Observer Corps.

Capt. Meyer outlined the job being accomplished by the Air Defense Command and emphasized the close coordination necessary between Air Force, Navy, Army and Civil Defense agencies. Lt. Turner outlined the program being conducted by the Springfield Filter Center and appealed for more volunteers to serve as Ground Observers.

Films and film strips portrayed the activity of the GOC and the ADC, and a monitor receiver set up in the meeting room gave the audience an idea of the manner in which ground control stations track and control aircraft in flight.

Among the 110 members and guests present at the dinner-meeting at the Elks Club in Belleville were a number of GOC members who had accepted the chapter's invitation to all volunteer Ground Observers in the Belleville area to attend the meeting.

Seattle

Mr. C. N. Keyes of the Pacific Telephone and Telegraph Company presented an interesting and instructive talk and demonstration of microwave phenomena and other modern communications developments at the chapter meeting on April 15th. A highlight of the program was the demonstration of the optical-like properties of microwaves as illustrated by the focusing of the waves with optical lenses.

Members present at the May 13th meeting paid tribute to the memory of Lee P. Church, chapter treasurer, who had died after a short illness.

The evening's program was conducted by John Stroble of the engineering department, accoustics and electronics section, Boeing Airplane Company. Mr. Stroble, who has been associated with wireless and radio from the early years of the century as an amateur, experimenter and engineer, gave an excellent account of his experiences in the radio field from his earliest experiments with wireless through the advent of broadcasting and up to the present time.

During the business session, Lee David of National Film Productions was elected to the office of chapter treasurer. Due to summer vacations and other activities, it was voted to discontinue chapter meetings for three months, with the next meeting scheduled for September 9th.

Washington

The chapter's annual elections brought in the following new officers for 1953-54: president — Thomas B. Jacocks, General Electric Company; vice-presidents — Maj. Gen. J. D. O'Connell, Deputy Chief Signal Officer; Capt. L. S. Howeth, Assistant

Scott-St. Louis. Guests and speakers at the April meeting which featured a program dealing with the Air Defense Command and the function of the Ground Observer Corps in the defense of the country.

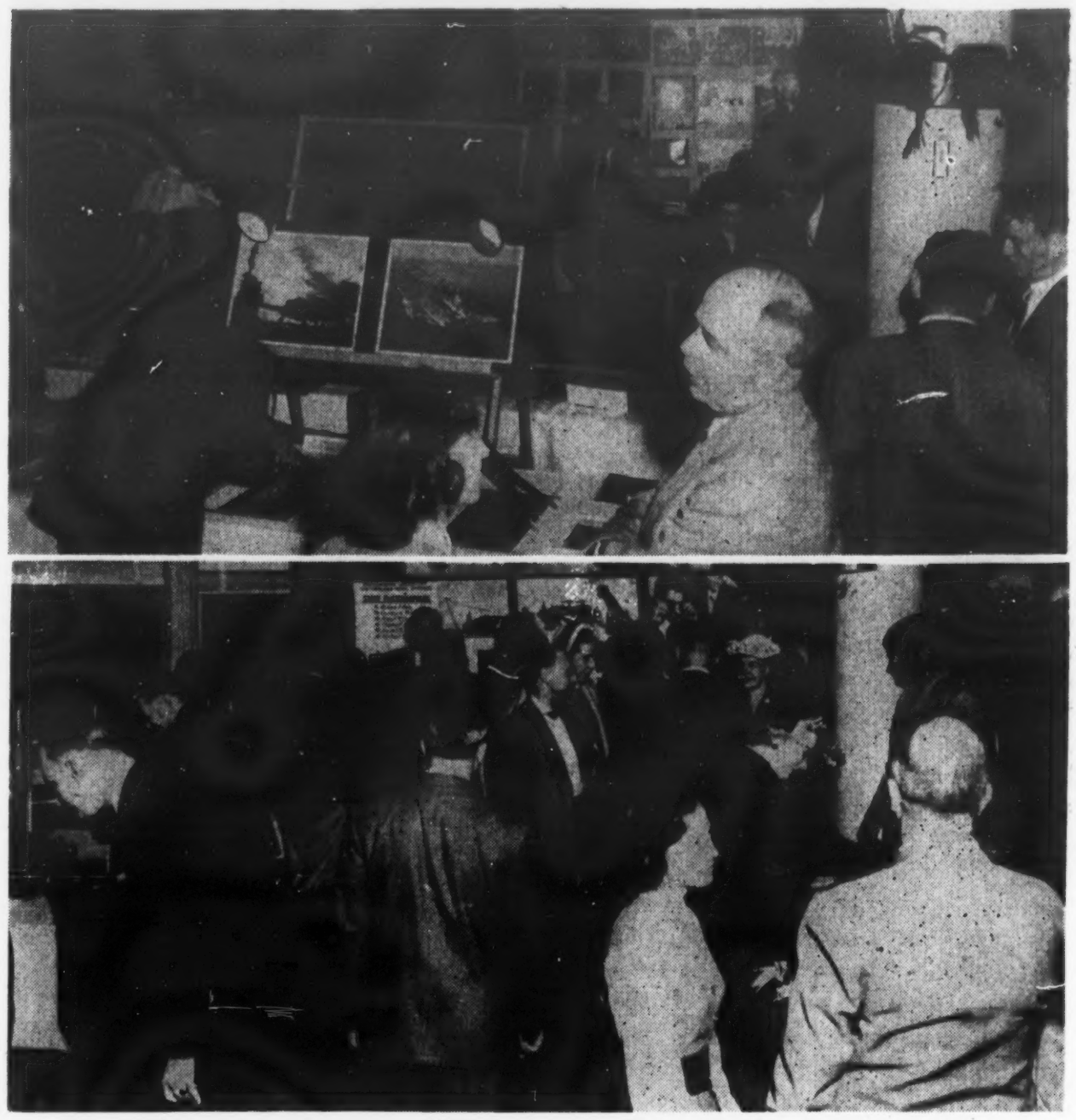
Director of Naval Communications; Col. A. L. Pachynski, Deputy Director of Air Force Communications; Frank W. Wozencraft, attorney; member executive committee—Rear Adm. Joseph R. Redman, retiring chapter president, and the new national president of the association; secretary-treasurer—D. A. Wilkenson, General Electric Co.; general counsel—Capt. F. O. Wellenbucher, USN (ret.).

Directors are: Capt. W. H. Beltz, USN; T. E. Berrier; Col. Percy G. Black; Col. Melvin G. Brown, USMC; Col. A. F. Cassevant, USA; Francis Colt deWolf; Francis Engel; Capt. F. R. Furth, USN; Col. P. A. Gugliotta, USAF; E. J. Girard; Col. R. H. B. Rockwell, USAF; and Col. C. S. Stodter, USA.

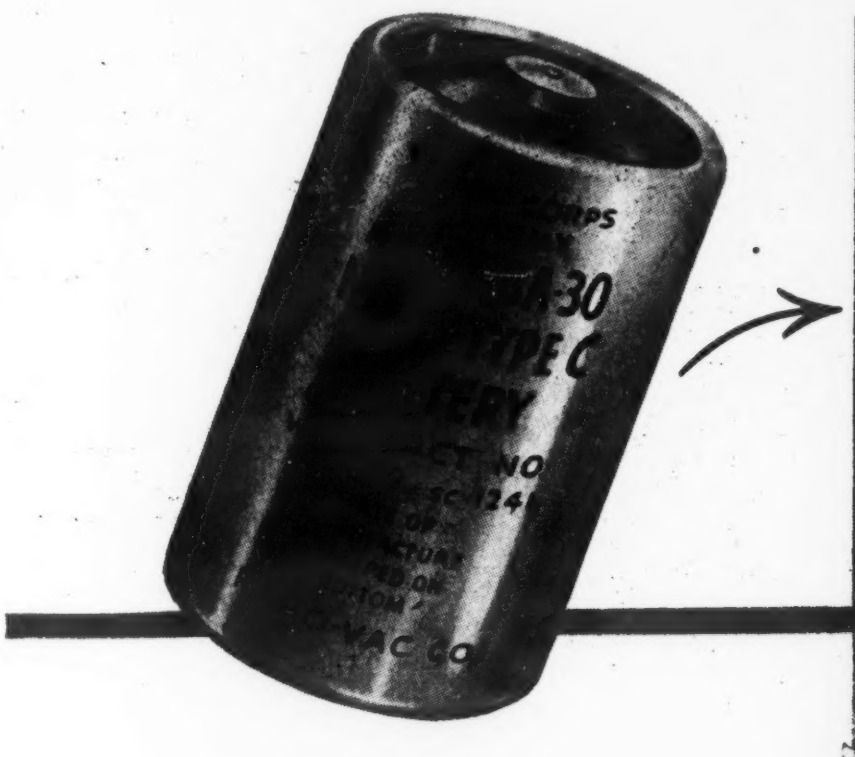
Preliminary plans for the 1954 annual convention to be held in Washington next spring were recently set in motion with the appointment of Col. Percy Black of the Automatic Electric Co., former chapter president, as chairman of the convention committee.

Student Chapter News

Iowa State College has just organized a student chapter of the AFCA. Report and photograph, which reached headquarters as SIGNAL went to press, will appear in the September-October issue.



San Francisco. Scenes from the photographic display at the joint dinner-meeting of the San Francisco Chapter and the Northern California Photographers' Association, held on May 28th at the San Francisco Naval Shipyard.



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Light when you need it from power that lasts, from power that's completely sealed in steel! These batteries stay fresh . . . regardless of climate or age. LEAK PROOF and guaranteed not to corrode your flashlight. The top performer in the battery industry. **Be sure you stock Ray-O-Vacs.**

Feel the Steel... Steel's the Difference!

RAY-O-VAC COMPANY, MADISON 10, WIS. RAY-O-VAC CANADA, LTD., WINNIPEG, MAN.

NEWS

Communications-Electronics-Photography

"MULTI-MASTER"

Latest addition to the greatly-expanding line of two-way radio equipment manufactured by the Bendix Radio Communications Division is a new FM transmitter-receiver complete with controls, associated power supply, antenna and microphone mounted in a single housing.

Weighing approximately 50 pounds and operating in the 152-174 megacycle band, the "Multi-Master" can be used as a fixed station or as a mobile unit and is easily adapted to narrow band operation.

The unit is versatile and rugged enough for thousands of uses. For example, it has a three-fold fixed station application in that it may be primary locally controlled, auxiliary locally controlled, or used as a portable emergency fixed station. One of the biggest advantages of the Multi-Master design is its application in the low power industrial field where it is necessary to have a single unit—operated on the business premises only—which is limited to three watt maximum input.

As its name implies, the Multi-Master offers a wide range of applications in the fields of agriculture, transportation, special emergency, public safety, maritime, public utilities and industry.

ROUTE BRIEFING

KINDLEY AIR FORCE BASE, BERMUDA — One of the fastest growing sections of base operations at this Atlantic Division (Military Air Transport Service) base in the past year has been Route Briefing under 1st Lt. Melvin A. Newtown.

A native of Watertown, N. Y., Lieutenant Newtown took over this section in December, 1951, when it occupied about three yards of counter space in the base operations room.

Now the briefing section requires a three-room site.

Route briefing is a service that has grown apace with the expansion of USAF global flying. Though the part that includes Kindley's bailiwick is concerned only with flights departing from its runways, it is a piece in the entire world-wide USAF setup. Coupled with such facilities at other AF or Navy airfields, a military plane can be advised navigationally on how to fly around the world safely . . . and wisely.

In addition to being a regular MATS navigation instructor, Lieutenant Newtown is qualified to brief through his familiarity with all air routes radiating from Bermuda. His frequent flights along these aerial paths make him fully aware of the aspects of navigational problems.

Radio briefing is also handled in the section by two well qualified MATS radio route briefing technicians, M/Sgt. Charles Tope and T/Sgt. Ralph V. Borden. These two NCOs have many years of military radio operation experience behind them and act also as check radio operators on transport flights of the 35th Air Transport Squadron based at Kindley.

Sergeant Tope, a lanky 37-year-old AF veteran who hails from Kingston, Ohio, is NCOIC of the section. He handles most of the office details such as correspondence, and maintaining the supply of maps and manuals.

A small section of the extensive maps at Kindley AFB, Bermuda, can be seen as Sergeant Borden, kneeling, selects a chart for Lieutenant Newtown.

Sergeant Borden, who calls Pawtucket, R. I., his hometown, is a former SAC (Strategic Air Command aerial radio operator and has spent more than 10 years of his 34 years in the Air Force.

Route briefing and radio briefing are wholly voluntary on the part of the section; the flight crews must request such information while clearing their flight. Most MATS crews passing through Kindley and base crews departing here are familiar with all routes and do not require such briefings. "Mainly, I brief transient B-29 or B-50 crews, or some itinerant military planes," Lieutenant Newtown said.

A glance about the well equipped quarters of the navigational section reveals its extensive map supply and variety of information available to flight crews solely for the asking. Everything there is there for only one purpose—to assist flight crews in reaching their destination safely. Not only U. S. military crews are served, Lieutenant Newtown pointed out, but his section is also available to flight crews of any military aircraft from friendly foreign nations.

WESCON TECHNICAL PROGRAM TAKES FORM

General outlines of the technical papers program for the forthcoming WESCON (Western Electronic Show and Convention) in San Francisco August 19-21 are crystallized into 17 sessions including approximately 85 papers, according to an announcement by Bernard M. Oliver, Hewlett-Packard Company, WESCON papers chairman. WESCON is jointly sponsored by the IRE (7th region) and WCEMA (West Coast Electronic Manufacturers Association).

Still subject to minor changes, shifts and additions, the program will include two sessions each on antennas, propagation, electron devices, circuits, and computers; and one session each on airborne electronics, microwave techniques, servos and telemetering, instrumentation, transistors, and nuclear-radiation measurements. Of the evening sessions scheduled, one will be on medical electronics, another on audio, and a third on generalized topics of broad scope.

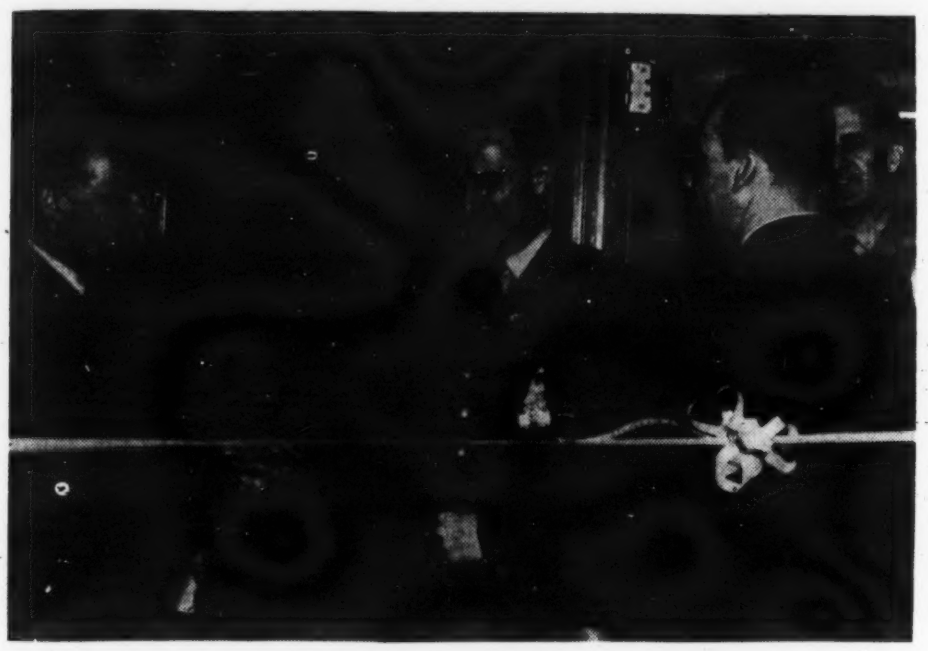
NEW ADC COMMUNICATIONS CENTER

An impressive ribbon-cutting ceremony featured the recent formal opening of the new Communications Center at Headquarters, Eastern Air Defense Force, at Stewart Air Force Base, Newburgh, N. Y. EADF is one of the three Defense Forces of the Air Defense Command and covers a 19-state area in the north and east sector of the United States.

The "snipping" honors went to Major General Morris R. Nelson, Commander, EADF, who accepted the shears from Captain Howard V. Conway of the 42nd Communications Squadron who is Officer-in-Charge of the EADF Communications Center. Opening of the new center became "official" when a teletypewriter message was sent by General Nelson to the Commanding General of the Air Defense Command at Ent Air Force Base, Colorado Springs, Colorado.

The new Communications Center boasts the latest approved equipment and an ideal working atmosphere, air-conditioning and acoustical-tiled ceilings to eliminate noise distractions and a pneumatic tube system for the rapid handling of messages to interested agencies.

Maj. Gen. Morris R. Nelson (center), Commander of the Eastern Air Defense Force of the ADC, shakes hands with Capt. Howard V. Conway (left), Officer-in-Charge of the new EADF Communications Center recently opened at Stewart AFB. Others in the picture are Col. Nelson S. Brooks (right), Director of Communications and Electronics, and Col. Frank E. Herrelko of the National Security Agency who appears just behind Col. Brooks.



INTERNATIONAL CAP CADET EXCHANGE

The Civil Air Patrol's 1953 International Cadet Exchange began on July 19 when 120 CAP Cadets arrived in Washington to prepare for their three-week visits to 16 foreign countries.

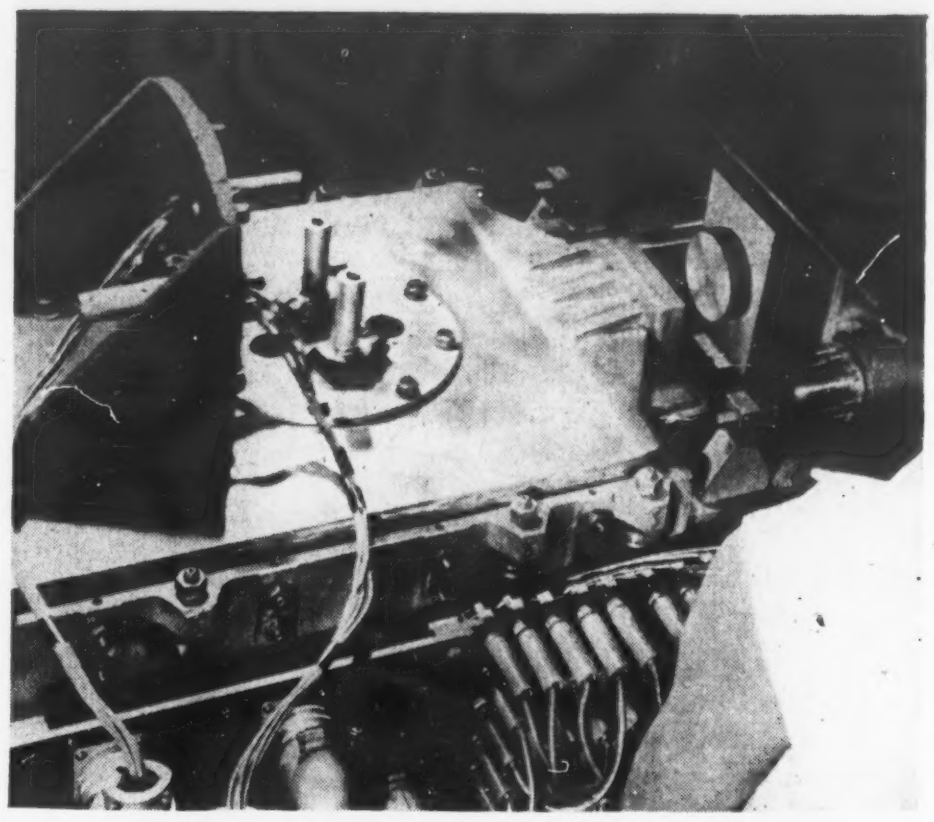
The foreign youths arrived in Washington July 23 for a three-day visit of the nation's capital before departing for the 16 CAP host wings. Following their visits in CAP communities the foreign youths will again meet in New York City for a four-day program.

Nations participating with the United States in the program this year are Belgium, Brazil, Canada, Denmark, France, Italy, Mexico, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Great Britain, and the new additions to the Exchange, Turkey and Greece.

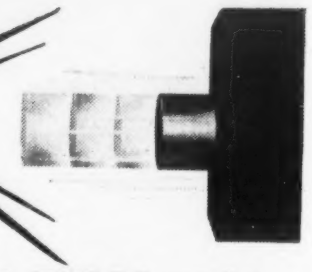
THIS DEPARTMENT'S PRINCIPAL SOURCE

Telecommunications Reports

Roland C. Davies, Editor
National Press Building
Washington, D. C.



Wham-O



Four TUNG-SOL ELECTRON TUBES receive a terrific jolt as a heavy steel battering ram smashes against the movable table on which they are mounted. Each tube is in a different position to determine stability in all directions. With an acceleration up to one thousand times the pull of gravity, this machine can give tubes a wicked beating.

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Tung-Sol Tubes for radio, TV and special industrial applications means top performance, longer and more efficient service life, plus lowest maintenance. You'll find complete satisfaction with Tung-Sol Tubes and Tung-Sol Service.

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TUNG-SOL ELECTRIC INC., Newark 4, N. J.

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RADIO LIFELINE

A new emergency-type portable lifeboat radio, so designed and constructed that even a person without any knowledge of radio can operate it, has been developed by the Marine Division of Mackay Radio and Telegraph Company, an associate of International Telephone and Telegraph Corporation.

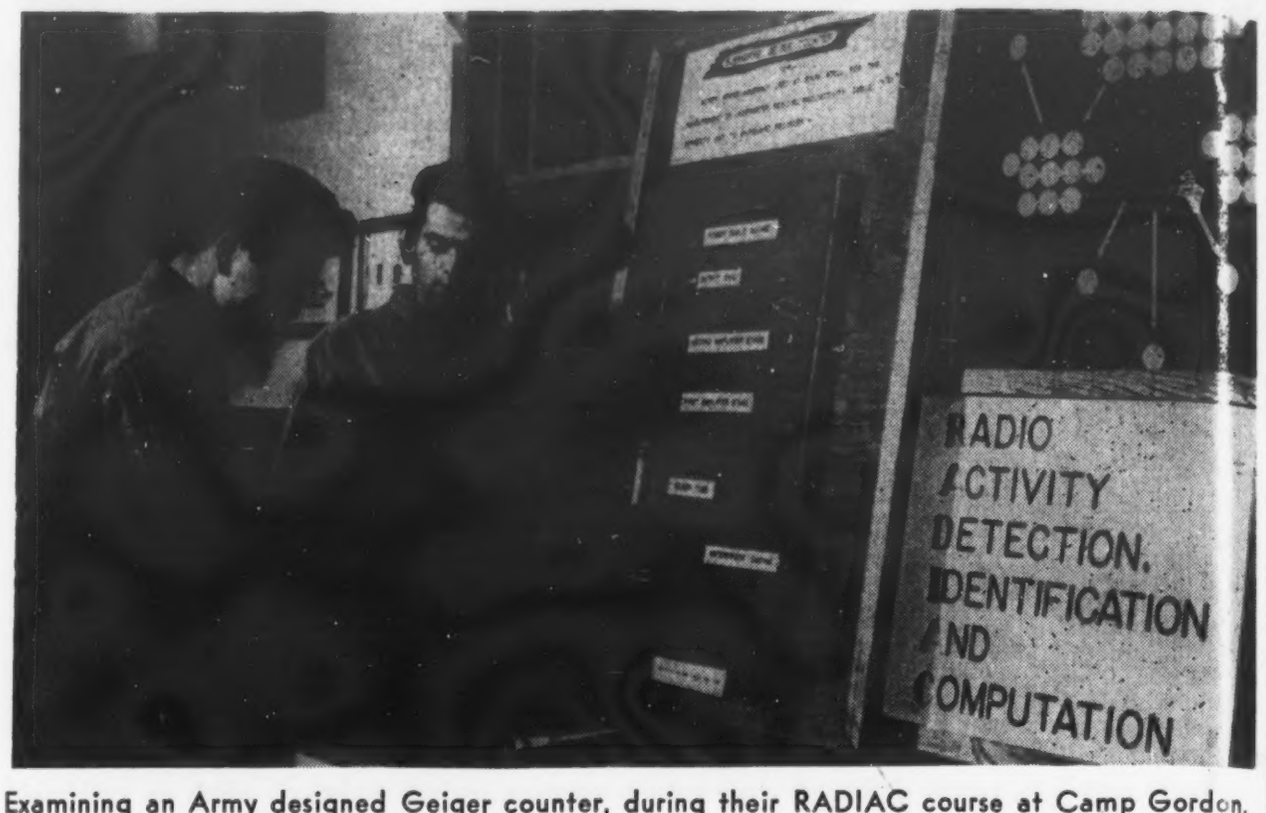
Incorporating the most advanced techniques, the compact, self-contained radio "station" represents a major contribution to safety at sea. It complies fully with the requirements of the International Convention for Safety of Life at Sea (London — 1948) and is the first such unit to be approved for use in this country by the Federal Communications Commission.

Geared to the needs of marine-disaster survivors, the transmitter-receiver operates on International Distress frequencies in both the intermediate (500 Kcs) and high-frequency (8364 Kcs) bands. A special device takes over the moment the set is placed in automatic operation and transmits alternate signals on both 500 and 8364 Kcs. Searching vessels use these signals to pinpoint the location of the lifeboat by means of direction finders. The equipment may also be operated manually by an experienced radio operator for transmission and reception of messages on either frequency.

The new Mackay Marine unit incorporates a two-band receiver and a built-in, hand-cranked generator that eliminates the need for storage batteries and permits operation over an indefinite period.

GLOBAL AUTOMATIC TELETYPE NETWORK

The most complex, highly geared system of communications maintained by a business organization on a global scale is operated by an international airline — Pan American World Airways. The system employs practically every known modern communications device, ranging from telephone to an electronic gadget which automatically rejects a letter of the alphabet which may have been scrambled by sun spots on its invisible radioteletype route across the North Atlantic. It not only rejects the scrambled letter, but automatically requests a correction — which is automatically returned.



Examining an Army designed Geiger counter, during their RADIAC course at Camp Gordon, Ga., are l-r: Pvt. Ronald Rosen, Highland Park, N. J.; and Pvt. Frank Hunger, Jersey City, N. J. The two long tubes affixed on the board are parts of an older Geiger tube used in the first underwater test of the atomic bomb at Bikini.

All messages are originated and received on teletype equipment consisting of a teletypewriter and receiver. Transmission of messages operates somewhat on the principle of the dial telephone. Whereas a telephone call is placed by dialing numbers, the teletype operator "places" a message by typing the proper two-letter directing code on the teletypewriter. This actuates the transmission equipment which automatically relays the message from circuit to circuit.

Despite the seeming complexity of PAA's network, a message will span the oceans and continents from one side of the world to the other in a matter of minutes.

FLEXIBLE ELECTRONIC CIRCUITS

A new technique for producing electronic circuits on a flexible cloth backing, as contrasted with the rigid etched or stamped circuits, was described by E. R. Bowerman and R. F. Walton of Sylvania Electric Products Inc. to engineers attending the annual National Conference on Airborne Electronics. The new flexibly mounted circuits consist of thin layers of copper, in the desired configuration, attached to a woven cloth by a thermosetting adhesive. One of the important advantages of the flexible circuit is that it may be attached to rigidly fastened components whose connecting terminals may have large dimensional tolerances. An appreciable amount of dimensional differences between units may easily be taken up by the flexible backing of the circuit.

The production of the flexible plated circuit consists in silk screening an insulating lacquer in a suitable pattern, onto a stainless steel plate, copper plating the exposed areas of the steel, and stripping the plated copper and the insulating lacquer from the steel surface by an adhesive tape. The plated copper and lacquer are stripped from the steel plate by pressing firmly and evenly an adhesive tape of suitable area over the circuit and then giving it a rapid, continuous pull. The thermosetting adhesive may be cured by heat, or it may be allowed to cure in the equipment in which it is installed.

It was pointed out that because any markings in the steel plate will be faithfully reproduced in the copper, identifying marks may be placed in the circuit by etching, engraving, or sandblasting appropriate symbols into the steel plate.

X-RAY DIFFRACTION SCHOOL

North American Philips Company, Inc., and its western dealers will hold the First Western X-ray Diffraction School at the Sir Francis Drake Hotel in San Francisco during the week of August 24-28.

The new school will be repeated annually on the west coast as the result of many requests from scientists in the area who asked the company to duplicate the program which has been so successful in the New York territory during the past seven years.

Morning sessions of the school will be devoted to lectures and afternoon meetings will involve laboratory demonstrations using the latest types of equipment. This work will cover powder camera techniques, the X-ray Diffractometer (Diffraction Goniometer) techniques, and the new X-ray Spectrograph (Fluorescence Analysis) techniques.

On Friday, August 28, the school will devote the day to actual application problems from the field and speakers will discuss details on methods currently in use around industrial laboratories and plants.

WESTINGHOUSE "AUTOMATION" DISPLAY COACH

"Automation," one of the hottest industrial subjects today, has been put on wheels by the Westinghouse Electric Corporation. As the theme of a unique display coach developed by the Standard Control Division, it is being taken directly to design engineers, maintenance people, and supervisory personnel in the machinery manufacturing industry throughout the United States. A mobile combination of the best features of an auditorium and exhibit hall, the coach shows how common electrical devices such as linestarters, control stations, motors, and circuit breakers — the "nuts and bolts" of any electrical system—can be used to achieve successful automation.

To make it as easy as possible for the customer's people to attend a showing, Westinghouse takes the coach to the customer's plant and runs consecutive hour and a half programs for groups of ten to twelve engineers at a time. Highlighting the introductory portion are movies featuring Burnham Finney, editor of American Machinist, and Tell Berna, general manager of the National Machine Tool Builders Association, on the subjects of "Automation Economics" and "Automation Mechanics."

The coach is starting its country-wide tour in the midwestern sector and is expected to make some 350 plant visits over a period of 14 months.

"BAKER MISSION"

A new Department of the Army Technical bulletin, the TB Sig 555, "Technical and Tactical Communications - Electronics Combat Information," is now being distributed to the combat communications man offering information that will best help him in carrying out his mission of getting the message there in the shortest time possible.

The new technical bulletin came about as a result of the findings of the "BAKER MISSION" to Korea. Dr. W. R. G. Baker, Vice President and General Manager of the Electronics Division, General Electric Company, and other leaders in electronics from industry and civilian schools, were requested by the then-Secretary of the Army, Frank Pace, Jr., to travel to Korea and explore the whole field of combat electronics and communications.

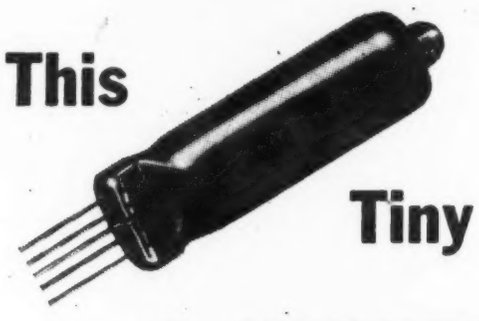
Witnessing first hand the complex and difficult role of the communicator in modern warfare, the mission realized the necessity of passing on to the communicator all the current knowledge available to assist him both in carrying out his mission and responsibilities to his commander and made recommendations resulting in the publication of TB Sig 555.

To keep him fully informed at all times on combat communications-electronics, the communicator must have the benefit of the experiences of communications personnel of all the combat branches. This technical bulletin will serve to acquaint him with up-to-date techniques of operation, expedients and tips on maintenance. It is designed to promote an exchange of ideas, thereby adding impetus to original thinking that will contribute to improvements in combat communications-electronics.

RAYTHEON

Excellence in Electronics

From This



Tiny Tube . . .

A HARVEST OF HAND RADIOTELEPHONES

The subminiature tube, a Raytheon development, made possible this lighter, more compact hand transmitter-receiver AN/PRC-6. Raytheon developed and is mass-producing this equipment . . . another Raytheon contribution to improve the effectiveness of our Armed Forces.

RAYTHEON MANUFACTURING CO.

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Radio Military Amateurs

MARS POLICY ON CIVIL DEFENSE

By joint agreement the Department of Army and the Department of Air Force have issued the policy indicated below to military commanders in the interest of providing guidance relative to civil defense planning.

"Within the scope and mission of the MARS program as approved and published, the use of MARS facilities as a military communications asset in support of Civil Defense will be governed by these policies. Within the current availability of personnel and equipment MARS may:

a. Make available communications services between the Military Forces in support of civil defense and the civil defense agencies.

b. Make available communications services for civil defense forces on a temporary or emergency basis when such services are not otherwise available.

c. Make available radio terminal facilities at designated military installations for civil defense tie-in as required.

d. Make these services available on military frequencies assigned to established MARS networks."

The military requirement for MARS and the availability of personnel, equipment, and frequencies during periods of national emergency will govern the extent to which MARS services can be made available to Civil Defense Agencies.

A survey will be conducted by MARS in order to determine those civilian members who will be qualified and willing to participate in this communications support mission.

NAVY ARMED FORCES DAY RADIO ACTIVITIES

One hundred and thirty-seven operators have received certificates of merit signed by the Honorable Charles E. Wilson, Secretary of Defense, in recognition of making perfect copy of his Armed Forces Day message to radio amateurs. The message was transmitted at 25 w.p.m. by military stations AIR, NPG, NSS, and WAR.

MESSAGE FROM SECRETARY OF DEFENSE

IT IS A PLEASURE FOR ME AS SECRETARY OF DEFENSE TO EXTEND ARMED FORCES DAY GREETINGS TO THE RADIO AMATEURS OF AMERICA. OUR THEME FOR TODAY IS "POWER FOR PEACE" AND THE SCIENTIFIC HOBBY OF AMATEUR RADIO—WHICH HAS MADE POSSIBLE MANY OF THE COMMUNICATION AND ELECTRONIC MARVELS OF OUR AGE—IS SYMBOLIC OF AMERICAN POWER FOR PEACE.

Lt. L. C. Moore, USN (W4UCN), keeping log and J. L. Lambert, RMI, USN (W3-SSL), operator, at NSS during the military-to-amateur radio test on Armed Forces Day, May 16th.

RADIO AMATEURS OVERCOME BARRIERS OF LANGUAGE AND ACADEMIC BACKGROUND. THEY CONDUCT TECHNICAL INVESTIGATIONS FOR THE ADVANCEMENT OF THE RADIO ART AND THE ULTIMATE BETTERMENT OF MANKIND. THE POTENTIAL USE OF AMATEURS FOR BOTH MILITARY AND CIVILIAN DEFENSE IS CLEARLY DEMONSTRATED BY THE PUBLIC SERVICE RENDERED LOCAL AUTHORITIES AND RED CROSS OFFICIALS IN TIMES OF DISASTER AND COMMUNICATION EMERGENCY. THE DEPARTMENT OF DEFENSE PLEDGES CONTINUED SUPPORT OF THE AMATEUR RADIO SERVICE IN ALL ITS PUBLIC SERVICE ACTIVITIES. SIGNED CHARLES E. WILSON.

Another feature of Armed Forces Day was the Military-to-Amateur radio test. Operating on preannounced military frequencies, AIR, NSS, and WAR made test contacts with radio amateurs. A total of 342 contacts was made during this test. Special Armed Forces Day acknowledgment (QSL) cards have been sent to all amateurs who participated.

Examining a plaque given Lt. Minkel in recognition of his work as MARS Director are: Maj. James A. Long, Chief, MARS (Army); 1st Lt. Edward J. Minkel, MARS Director, First Army; Mr. Armandus Wentzel, Net Control for MARS (Army) New Jersey "Sugar" Net, and Lt. Col. Gene M. Ranvier, Signal Section, First Army.

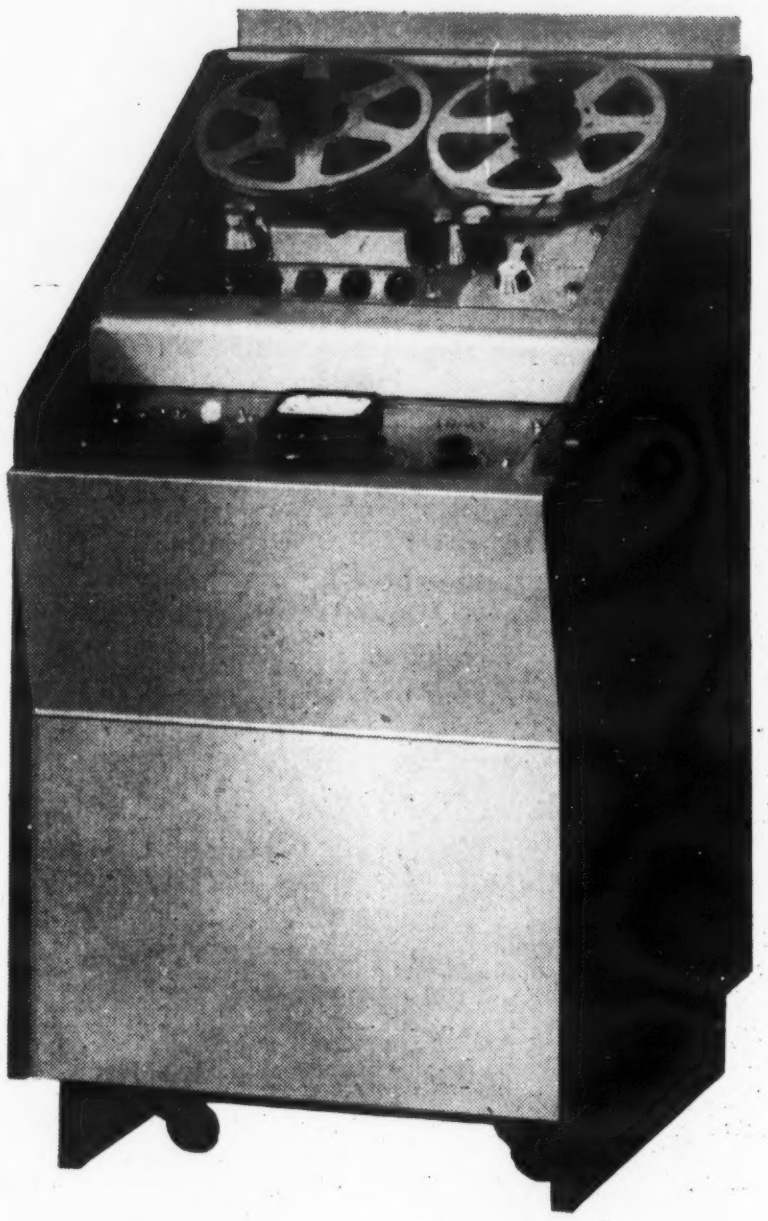
NEW MARS (ARMY) 1ST ARMY DIRECTOR

Captain Thomas W. MacClure (AB6AAY), U. S. Army Signal Corps, has been appointed MARS Director, First Army by Colonel F. E. Kidwell, First Army Signal Officer, replacing First Lieutenant Edward J. Minkel who has been reassigned to the Far East Command.

Lt. Minkel was presented with a plaque in recognition of his achievement as MARS Director at a farewell ceremony 24 April. Approximately

ANNOUNCING

THE **AMPEX 350** TAPE RECORDER



- **A NEW MODEL** *by the leader in tape recording*

  Ever since the first AMPEX (the Model 200) set a milestone in progress by making recorded sound "come to life," the broadcasting and recording industries have rightly expected new AMPEX models to set the pace.

- **A NEW SLANT** *on operating convenience*

  With introduction of the AMPEX 350, a new 30° slant on the top plate puts the reels, editing knobs and all controls within easier reach of any operator — tall or short, standing or sitting. Tape editing is faster and less tedious. Servicing is simplified by pivoting of the top plate and sliding out of the internal assemblies.

- **A NEW STANDARD** *of reliability*

  In precision of timing, response to controls and freedom from breakdowns and repairs, AMPEX Tape Recorders have consistently led the industry. For utmost reliability, this new Model 350 has a three motor tape transport mechanism (previously used in the AMPEX 300, but now available in this lower priced machine).

- **A NEW REASON** *to change to the best*

  Ultra high fidelity recording is now priced within reach of discriminating users in every field — radio stations, home high fidelity systems, schools, industry and professional music. And because the AMPEX 350 is built to last, it will cost the least per hour, per week and per year.

AMPEX MODEL 350

Tape speeds — 7½ & 15 in/sec. or 3¾ & 7½ in/sec.

Frequency response

15 in/sec. — ± 2 db from 30 to 15,000 cycles
7½ in/sec. — ± 2 db from 30 to 10,000 cycles
± 4 db from 30 to 15,000 cycles
3¾ in/sec. — ± 2 db from 50 to 7,500 cycles

If you plan for tomorrow, buy AMPEX today

For further details write today to Dept. P

AMPEX

ELECTRIC CORPORATION

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45 MARS members and guests attended the ceremony at the Fort Wadsworth Officers' Club.

Principal speakers for the occasion were Major James A. Long (A3UWI), Chief, MARS (Army); Lieutenant Colonel Gene M. Ranvier (A2BNQ), Signal Section, Headquarters First Army; Major J. J. Richmire, MARS Director, First Air Force; Lieutenant Colonel Samuel Kale (A2VU), New Jersey MARS Director; Major Madison Thomas, MARS Director for New England; Major Carl Vorlander, Commanding 1267th Army Service Unit, Fort Wadsworth, New York; Captain Thomas W. MacClure, and Mr. Robert Link, Director of Communications for Civil Defense of New York City.

Major Theodore Simmington, Jr. (A1JOT), former MARS Director, New England, was master of ceremonies. Mr. Armandus Wentzel (A2HX) presented the plaque to Lt. Minkel on behalf of MARS members and Civil Defense officials of the First Army area.

Chief Radioman J. G. McGettigan (W2VZM) visits the amateur radio station of Mrs. Mae Burke (W3CUL). During exhibits of the Naval Electronics Program of the 4th Naval District, Chief McGettigan operates station K3USN and accepts traffic for men and women in the Armed Forces. A major portion of this traffic is relayed through Mrs. Burke's station in Folsom, Penna. W3CUL is well known in amateur circles for her outstanding work in the handling of an average of about 5,000 messages a month for service personnel.

MAJOR MACK REPORTS TO KEFLAVIK AIRPORT

Recently assigned to his second tour of duty among the winds and snows of faraway Iceland is Major Charles C. Mack, USAF, former Chief MARS.

Serving at Headquarters, Iceland Defense Force, an assistant signal officer, Major Mack has long been connected with radio work, both officially as a member of the Air Force and on an amateur status. An active participant in the American Radio Relay League and the Armed Forces Communications Association and holder of an Advanced Class License as a "ham" operator, perhaps his most interesting occupation has been that of Chief of the Military Affiliate Radio System (Air Force) for a little over 2 years.

Maj. Charles C. Mack, USAF, former Chief of MARS (Air Force), inspects Keflavik Airport's radio station TFK, a member of the Armed Forces Radio Service playing an important part in keeping the men and women of the Iceland Defense Force both entertained and well informed. Seated at the control board is Pfc. Bob Crystal, disc jockey at TKF.

RADIOTELETYPEWRITER BROADCAST

Armed Forces Day found WWV announcing W-2 conditions (very poor). In spite of this, a very creditable showing was made by amateurs who copied the radioteletypewriter broadcasts.

The broadcast from NDC, Norfolk, Va., was copied by K1NAI, W1UDX; W2's KLD, SKK, TFT, WCE; W4's MOP, NIS, ZCA; K4NRY; K5NRL; W8's BYB, NTE, and W9's AKP, TCJ. Of these, W3WCE, W4MOP, and W4ZCA made perfect copy.

NDS, Great Lakes, Ill., was copied by W2's JAV, KLD, PAI, PAU; K2NRS; W3's PYW, USA; K4NRY; W4OLL; W5USN; K5NRL; K5AIR; W9's GRW, TCJ, THE; and WØ's CIH, QHG. Of these, K5NRL, W9GRW, W9TCJ, and W9THE made perfect copy.

Ten stations copied NDW2, Salt Lake City, Utah. Apparently this station was not adjusted for standard shift. However, W6ITH, W6PQ, K6USN, and K6USA made perfect copy and the following made readable copy: W6CLW, W6FLW, W6LIJ/7, W6YDK, K7NRU and WØUVL.

Conditions on the West Coast appeared to be fairly good; nine stations submitted perfect copy of the broadcast from NDW, San Francisco, California. These were W6's BV, DOU, EV, FCS, ITH, KY, NSS, OWP, ZH. Good copy was submitted by W4TAC/6, W6's AEE, CLW, FLW, NYF, SCQ, and W7LQC/W7GPR.

The message used in the radioteletypewriter broadcasts was as follows:

Unmatched Selectivity—
Even at Twice the Money!

Hallicrafters Model S-76

★ Dual Conversion — no images!
★ Automatic Noise Limiter!
★ Giant "S" Meter — 4" Scale!
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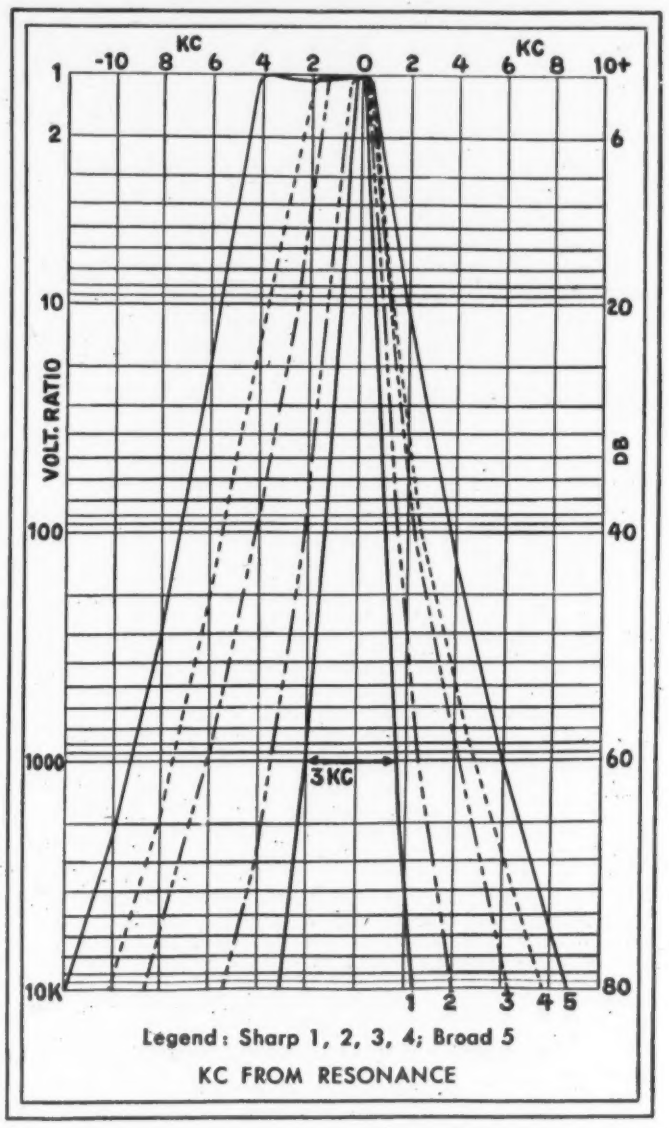
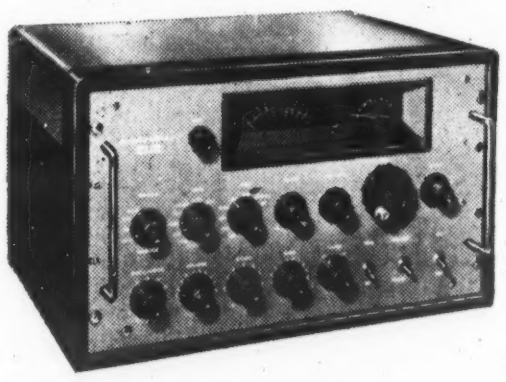
The medium priced receiver that made the industry adjust its sights! Unmatched selectivity, even from receivers that cost twice as much. Just check the selectivity curves against other sets—see what Hallicrafters unmatched design experience can mean to you.

Model S-76 is a 4-band, dual conversion superheterodyne circuit, covering 538 kc to 32.0 mc. Bands: 538 to 1580 kc, 1720 kc to 4.9 mc, 4.6 mc to 13.0 mc, 12 mc to 32.0 mc. Two 3 gang tuning condensers are used, the first for main tuning and the second gang for fine tuning and electrical band spread. 1 r-f, 2 conversion, 2 i-f stages. 5 position selectivity. Phono input jack. 3 watts audio output. Only **$179.50**

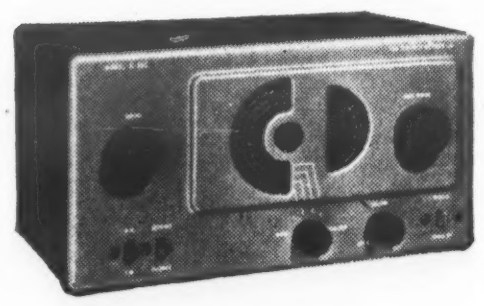
SELECTIVITY CURVES
S-76





TVI Suppressed 100 Watter—Model HT-20—Continuous coverage from 1.7 mc to 31 mc. Full band switching. Choice of 10 crystals. Shielded, filtered r-f compartment plus built-in, low-pass 52 (ohm) coaxial line output filter reduces to more than 90 d.b. all responses over 40 mc. Only **$449.50**

The Finest Buy in SW!—The S-38C—Best performance per dollar, you'll find, the S-38C is the outstanding low priced set on the market. 540 kc to 32 mc in 4 bands. Maximum sensitivity per tube — far out-performs ordinary broadcast sets. Built-in speaker. 115 V AC or DC. 4 tubes plus rectifier. **$49.50**



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AMATEUR RADIO

"IT IS ESSENTIAL TO THE NATIONAL DEFENSE THAT RADIOTELETYPE CIRCUITS ACHIEVE A DEGREE OF RELIABILITY AT LEAST EQUAL TO THAT OF RADIOTELEGRAPH X AN IMPORTANT FACTOR IN ACHIEVING THIS RELIABILITY IS A SOURCE OF PERSONNEL WHO ARE FAMILIAR WITH THE TECHNIQUES AND EQUIPMENTS USED IN RADIOTELETYPE COMMUNICATION X WITHIN THE LAST FEW YEARS THERE HAS BEEN A GROWING INTEREST IN RADIOTELETYPE FOR AMATEUR RADIO COMMUNICATION X THE INDIVIDUAL AMATEUR HAS PROVED THAT THE SKILL AND KNOWLEDGE GAINED FROM THE PURSUIT OF HIS HOBBY STAND HIM IN GOOD STEAD IN BOTH INDUSTRY AND IN MILITARY SERVICE X WHILE THE NUMBER OF AMATEURS WHO ARE ABLE TO COPY THIS MESSAGE IS COMPARATIVELY SMALL COMMA THE RECENT ACTION OF THE FEDERAL COMMUNICATIONS COMMISSION COMMA IN OPENING ADDITIONAL AMATEUR BANDS TO FREQUENCY SHIFT KEYED TRANSMISSION COMMA HAS PROVIDED A NEW OPPORTUNITY FOR AMATEUR ACTIVITY X WE ARE CONFIDENT THAT RADIO AMATEURS WILL MEET THIS OPPORTUNITY WITH THEIR USUAL ENTHUSIASM COMMA ENERGY COMMA AND INGENUITY X GEORGE I BACK MAJOR GENERAL USA CHIEF SIGNAL OFFICER W B AMMON REAR ADMIRAL USN DIRECTOR NAVAL COMMUNICATIONS GORDON A BLAKE BRIGADIER GENERAL USAF DIRECTOR OF COMMUNICATIONS"

The text of the message was the same for all transmitting stations except that the word "MAJOR," in Major General Back's title, was transmitted "MJOR" by NDC, and the word "opportunity" was transmitted "oportunity" in one portion of the broadcast from NDW2.

An interesting feature was reported by W6CMQ. Official duties in the Navy prevented him from participating in reception of the broadcasts in the HF band. However, the text of the broadcasts was relayed to him by W6CLW on 147.85 MCS. This VHF transmission was received during his absence on "automatic start" equipment. W6CMQ states, "This equipment is common in the Los Angeles area. The reception of the Armed Forces Day test message by this means indicates another phase of amateur preparedness to meet emergency communication requirements."

ARRL ANNUAL FIELD DAY

Strange sounds emanated from the fields and forests of America on June 20th and 21st as thousands of amateur radio operators conducted an emergency communications preparedness test.

The American Radio Relay League sponsored the Annual Field Day, the seventeenth to be held, during which hundreds of club groups and individual participants tested their equipment and operating skills under simulated emergency conditions.

To prove the efficiency of their stations, these amateurs assembled and operated equipment in lonely stretches of forests, in parks, along the seashore and on mountain tops. The usual silence of these desolate spots was broken by the putt-putt of the generators, the voices of amateurs calling "CQ Field Day" and the sounds of Morse code. Transmitting and receiving gear was powered by storage batteries and gasoline-engine generators, for these are the power supplies upon which the amateur may have to depend in cases of actual emergency communications, whether it be flood, tornado or bombing attack. Field Day stations consisted of a variety of installations—from single transmitters with lone operators to a dozen complete stations in one group manned by 25 to 50 operators working on shifts.

The mobile unit was much in evidence this year. Complete self-powered sending and receiving stations installed in cars and trucks, these mobile units have already proven themselves invaluable in dispatching information and summoning aid from disaster scenes.

The Annual Field Day is the "proving ground" of men and equipment ready to serve at a moment's notice whenever an emergency arises.

NRL GETS NEW STATION

In connection with the 30th anniversary of the Naval Research Laboratory on July 2nd, 1953, radio amateurs at NRL obtained permission to operate an amateur radio station. The FCC granted permission for the use of call letters W3WV at NKF, "NKF" having been the designation for the station operated at NRL in the mid-twenties, under Presidential authority. Leo C. Young, who is still at NRL, and is W3WV today, was also the operator of NKF. The station is presently scheduled to be on the air from 2:00 to 6:00 p.m. (EDT) and to operate the amateur bands.

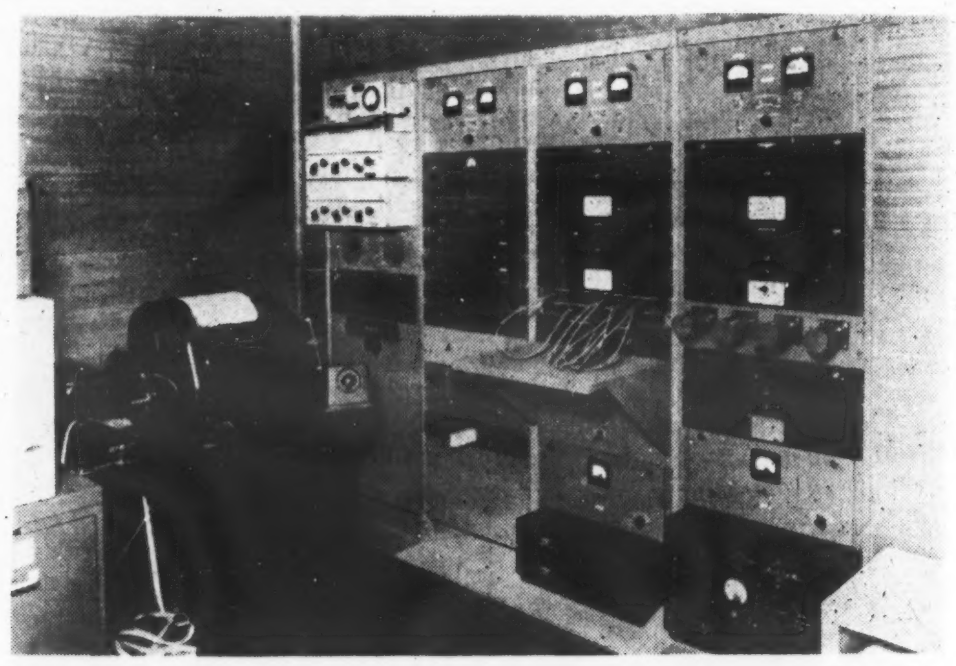
TWO-WAY RADIO LINKS BOSTON CABS TO DEFENSE

A two-way radio communications system that makes the taxicab a roving outpost of Civil Defense was put into operation recently in Boston by the Independent Taxi Owners Association.

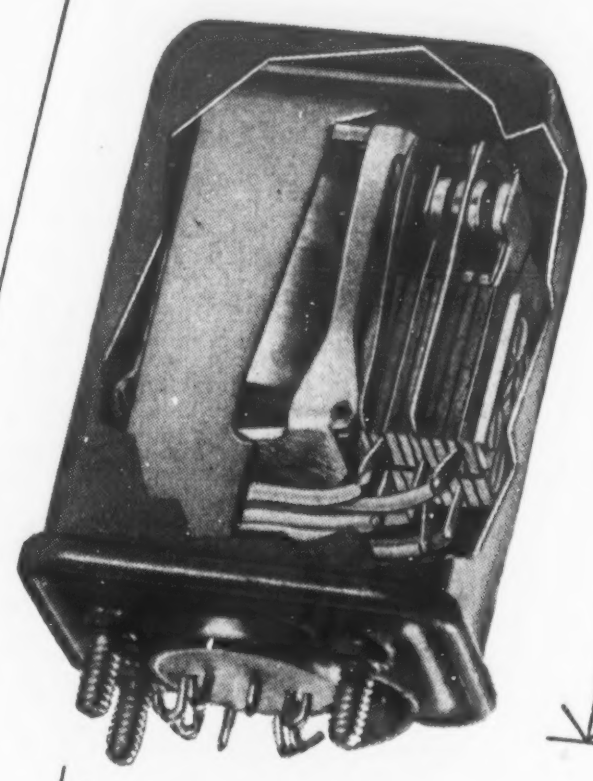
The radio equipment, providing voice communication between taxis and a central transmitting-receiving point, is in the ultra-high-frequency radio band which can be tied into local Civil Defense headquarters.

The communications system was installed by RCA Victor. The ultra-high-frequency system has five channels in the 450-megacycle band.

Shown below are the operating desk (left) and radioteletypewriter receiving equipment bays (right) at amateur radio station W6ITH, owned and operated by D. Reginald Tibbetts of Morago, California. W6ITH made solid copy of the radioteletypewriter broadcasts from both San Francisco and Salt Lake City on Armed Forces Day.



miniature relay with heavy-duty contacts... meets rigid requirements for aircraft service



Automatic Electric Series SQD Relay—Quick acting, double arm, DC—shown in AE 1300 Enclosure—Piece number for Relay and Enclosure shown above is Z 19870

RELAY SPECIFICATIONS

Designed to meet or better all provisions of MIL-R-6106 (Joint Military Service Specifications for Relays).

Designation: Class "S" Relay, with heavy-duty contacts.

Contacts: Large disc-type. Will carry up to 650 watts at a maximum of 6 amperes for inductive or non-inductive load. Makes or breaks up to 250 watts at a maximum of 5 amperes.

Vibrations: Withstands 25G. vibration in excess of 10 to 55 cps with maximum excursion of .060 inches.

Shock: 25G.

Ambient Temperature: — 55°C to + 75°C.

Operate Time Range: 0.002 - 0.016 sec.

Release Time Range: 0.005 - 0.025 sec.

Contact Spring Capacity: 2 pile-ups. Max. of 4 springs per pile-up with standard construction.

Dimensions (without enclosure): Length, $1\frac{17}{32}$"; Height, (depending upon the number of contact springs), $1\frac{3}{8}$" to $1\frac{1}{2}$"; Width, 1".

Net Weight (without enclosure): $1\frac{1}{2}$ - 2 ozs.; in A.E. 1300 Enclosure, 5 - $5\frac{1}{2}$ ozs.

Enclosures Available: AE 1000, AE 1100, AE 1600, AE 2300 and AE 5100. AE 5200 Enclosure (only $\frac{31}{32}$" x $1\frac{1}{2}$" x $2\frac{1}{32}$") can be used for a Series SQA (single pile-up) Relay with maximum of 4 springs.

Here's a new version of the rugged, reliable Class "S" Relay . . . re-designed by request for *heavy-duty* service. It's ready now for relay users seeking peak performance in miniature size! Large, disc-type contact points make and break loads up to 250 watts at 5 amperes or more.

Here's a relay which combines exceptional resistance to vibration with speedy operation, minimum inductance, light weight, small size, dependability. Class "S" with heavy-duty contacts is available with or without enclosure. For protection against tampering, humidity, temperature extremes and harmful atmosphere, this relay is now engineered in a choice of 5 different hermetically-sealed enclosures, each with a variety of terminations.

Your request for more detailed data will receive prompt action. Write today to: Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7, Ill.
In Canada: Automatic Electric (Canada) Ltd., Toronto.
Offices in principal cities.

RELAYS SWITCHES

PRODUCTS OF THE INDUSTRIAL DEPARTMENT OF

AUTOMATIC ELECTRIC

CHICAGO

PHOTOGRAPHY

COLOR CLINIC

An outstanding "Color Round Table" which will bring picture-takers of all types answers to their problems on color photography has been scheduled for the PSA Convention in Los Angeles in August, by the PSA Technical and Color Divisions.

The "Round Table," which will be open to all who register at the PSA Convention in Los Angeles (August 3 through 8) will be sparked by an outstanding group of five color specialists. Members of the panel will include representatives of the largest photographic manufacturers and practicing photographers with extensive experience in the field of color.

Members of the panel of experts will include Al Shelton of the Ansco Company, Howard Colton of the Eastman Kodak Company, Werner Alexewicz of McGraw Colorgraph, Bill Drewry of Drewry Photocolor Corporation, and Joseph Muench, pictorial photographer of national reputation. The moderator for the panel will be Henry Greenhood.

Mr. Shelton and Mr. Colton are expected to bring the manufacturers' viewpoint and technical know-how to the conference table, Dr. Alexewicz brings the viewpoint of people who make tri-color tissues for Carbo Printing and neutral tissues for gravure, Mr. Drewry is expected to bring the viewpoint of a processing laboratory director, while Mr. Muench will contribute a practicing photographer's viewpoint.

The meeting is planned as one which will interest all people connected with color photography and one which will provide answers to both simple and technical questions.

BOOKLETS FOR PHOTOGRAPHERS

For several years, the Eastman Kodak Company has made available to picture takers a booklet on picture taking indoors. Now the company has announced a new edition of this booklet, retitled, "Snapshots Indoors," which has been brought completely up to date, and provides all of the information anyone requires for making simple photos inside the home.

"Snapshots Indoors" provides full data on picture taking with flash, flood, and natural light. It also offers specific suggestions for best results when picturing babies and young children, making family "action" photos, recording holiday activities, and producing attractive and interesting still life studies.

Liberally illustrated wtih pictures and diagrams, the booklet will be available through Kodak dealers for 25 cents per copy.

A new free informational bulletin packed with tips on how to make better home movies is being offered to movie makers.

The first issue of the bulletin, "Kodak Movie News," will be mailed automatically to several hundred thousand movie camera fans in May. Additional names will be added monthly but home movie makers who do not receive the publication automatically may have their names added to the list by writing Kodak.

The bulletin is expected to be mailed on a bi-monthly basis. It will contain five pages of "how-to-do-it" information, and one page of full color reproductions of "Good Shots" by amateur movie makers. Information will be seasonal in content, and slanted to provide the maximum amount of helpful information to movie makers.

The first issue features, "Movies Should Move"—advice on how to get better action in home movies; "The Eyes Have It"—which provides data on correct exposure; "It's A Frame"—which includes tips on better composition; "Scenario For Spring"—a simple script that anyone can follow for the production of a home movie; and "Here's The Inside Story"—which gives tips on picture taking indoors with flood lamps.

Movie makers who would like to receive "Kodak Movie News" should write to Editor, Kodak Movie News, Eastman Kodak Company, Rochester 4, New York, and ask to have their names added to the list.

PROFESSIONAL TYPE DEVELOPING OUTFIT

A new, complete home developing kit, the "3A Home Developing Outfit," is now being introduced by Ansco, Binghamton, N. Y.

Offering greatest possible simplicity to encourage the beginning photographer, with professional-type equipment which will appeal to the advanced amateur as well, this new addition to Ansco's line of photographic products should lure a lot of camera fans away from their TV sets into the darkroom, according to Harold R. Dean, Manager of Ansco Amateur Sales.

Featuring a new professional-type contact printer, with built-in exposing on-and-off light switch, constant burning red safelight and hinged platen, the outfit also includes the new Ansco Daylight Developing Tank with the self-loading Reel. Also included are three developing trays, a glass graduate, a combination thermometer-stirring rod, four stainless steel film clips, two film clip lead weights, Ansco Convira Printing Paper, two packages of Ansco Vividol Paper Developer, 1 qt. size Ansco Normadol Film Developer, 1 qt. size Acid Fixer with Hardener, a copy of Ansco's booklet "Developing and Printing Made Easy." Also part of the outfit is a unique two-way safelight with removable red filter for film developing, and an amber bulb for contact printing.

TV ON TAPE

According to a technical note appearing in Tele-Tech and Electronic Industries for May 1953, nearly a dozen laboratories are now engaged in work on recording TV video signals on magnetic tape. Further, it is reported that half of these laboratories are engaged in Government contracts. It is known that the Armed Forces are interested in such recordings for military photography since such a tape record would be immune to radioactive fogging from nuclear bomb sources.

Replacing light-sensitive photographic film, the tape is immediately available for reproduction without the conventional "developing" or other processing of photography and, furthermore, it could be edited and spliced like sound tape.

Companies reported as working on such recording are as follows: Bing Crosby Enterprises, General Electric, R.C.A., Webster-Chicago, Magnecord, Freed Radio and Alan Shoup Laboratory.

As to R.C.A.'s part in the work, it may be of interest to note that Brigadier General David Sarnoff, Chairman of the Board of R.C.A., who was honored as the first recipient of the Founders Award of the IRE at the

Accurate Field Testing of X-Band Radars

WITH MICROLINE* TEST SET AND RANGE CALIBRATOR

Included in Sperry's complete line of Microline instruments are the 38A Test Set (TS 147B/UP) and the AN/UPM-11 Range Calibrator for the accurate testing of X-band radars. These equipments. of rugged design for field usage, can also be employed in laboratory and production testing.

MODEL 38A Test Set (TS 147B/UP)

This portable test set is suitable for measurements on all radar, beacon or missile systems in the 8500-9600 mc. range. It supplies microwave signals of known frequency and power, either continuous wave, frequency modulated or externally modulated. It also measures the power and frequency of external signals in the above frequency range. Model 38A contains a direct reading frequency meter, wattmeter and signal generator which allow the measurement of power and frequency of radar transmitters as well as receiver sensitivity, bandwidth, recovery time and AFC action. Tuning of the frequency meter is accomplished with both a direct and a 5 to 1 reduced drive mechanism for ease of determining narrow pulsed signals as short as 0.2 microseconds.

SPECIFICATIONS:

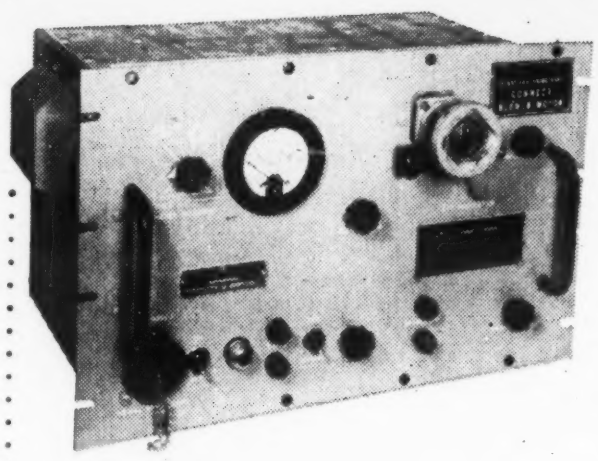
R-F Power Output: Adjustable from −7 to −85 dbm (decibels relative to one milliwatt).

R-F Power Input: From +7 to +30 dbm.

Accuracy: ±1.5db. A calibration chart is supplied.

Frequency Meter Accuracy: ±2.5 mc. absolute at 25°C and 60% RH. Calibration point 9310 ± 1.0 mc.

Our nearest district office will be happy to supply further information on these and other Microline instruments.



MODEL AN/UPM-11 RANGE CALIBRATOR

This instrument is used to test X-band fire-control radars which operate in the 8500-9600 mc. frequency band. It receives microwave signals from a radar and responds with accurately spaced pulses thereby providing a means of calibrating the radar range. It can also be used to boresight the antenna axis of any X-band radar system.

SPECIFICATIONS:

Range Markers: 200 to 50,000 yds. depending on delay line

Accuracy: ± 5 yards

Repeatability of readings (same radar system): ± 1 yard

Tuning: Manual or AFC

T. M. REG. U. S. PAT. OFF.

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DIVISION OF THE SPERRY CORPORATION

GREAT NECK, NEW YORK • CLEVELAND • NEW ORLEANS • BROOKLYN • LOS ANGELES • SAN FRANCISCO • SEATTLE
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annual banquet of the Institute at the Waldorf-Astoria Hotel on March 25, 1953, said this: "I was surprised at the demonstration I saw of a television program coming from New York and being simultaneously recorded on tape in the Princeton Laboratories 45 miles away. The recording was played back instantly. The quality of the recorded picture still needs improvement—but even its present performance convinced me that we will have the television tape recorder before the time specified (1956).

"Tape recordings will obsolete the use of film for television and reduce overall cost. Small degradations which mark the various steps in the production of a film, creating a cumulative effect in the final print, will be eliminated. This new method will revolutionize the entire art. As a simpler and cheaper process, it will extend into color TV; and it may extend into the motion picture industry as well.

"As you know, the recording of sound on magnetic tape already has reached a high degree of perfection. When recorded sound has served its purpose, it can be wiped off and the tape used over again. I believe that we now stand on the threshold of the same service for sight."

From another source, it has been reported that a video tape recorder has been developed to the point where it can record 260 times as much information as a sound tape system and commercial realization may be only a year away. The equipment in question was reportedly developed by Bing Crosby Enterprises working with the Ampex Electric Corporation. It uses a 1-inch wide tape with 11 video tracks and one sound track. The tape runs 100 feet per second in contrast to 15 feet per second for most high-quality sound equipment. The tape possesses ease in editing and erasure, reuse, and immediate "viewback." From the above, it would appear that considerable activity in this field is underway and that we may confidently expect extensive progress in the not too distant future.

Frank Smith

ANSCO COLOR SNAPSHOT CONTEST

One-hundred and one cash and merchandise prizes worth $12,000 will be awarded to winners in the 1953 Ansco Color Snapshot Contest, according to an announcement made by William Balch, Ansco General Sales Manager.

The new nation-wide contest, sponsored and conducted by Ansco, opened June 15. A new Ford car is to be given as grand prize. One hundred additional prizes will be awarded for Ansco Color Film snapshots. Fifty prizes will be given for pictures in the "scenic" class and fifty identical prizes will be awarded for snapshots in the "human interest" class.

First prize in each class is a round trip flight to Hawaii for two via United Air Lines, plus $100 cash in expense money. Second and third prizes in each class are $500 and $300 in cash, respectively.

There will be forty-seven other merchandise awards in each class, including the company's luxury-model Ansco Karomat 35mm miniature cameras and cases valued at over $175 each. Other winners will receive a choice of Ansco cameras, film or photo merchandise in the value of the award their pictures receive.

Entry blanks containing full details and complete contest regulations are available at photo dealers and wherever Ansco Color Film is sold.

Judges of the contest, which closes September 30, are: Sey Chassler, Color Camera Editor, Collier's Magazine; Joseph Costa, Chief Photographer, Sunday Mirror Magazine; Irving Desfor, AP News-features "Camera News" Columnist; Faye Emerson, noted television star; and Ray Mackland, Picture Editor, Life Magazine.

First prize in the Teen-Age Class of the 1953 Graflex Photo Contest was won by Rodger L. LaPelle of Philadelphia, Pa. The winning picture, seen below, was made with a Ciroflex in 1/50 sec. at f/8 on panchromatic film. Mr. LaPelle took this picture one morning on his way to school. Another entry of his took fifth prize in the teen-age division. (1953 Graflex Photo Contest)

SPE THIRD ANNUAL CONFERENCE

The Society of Photographic Engineers, Washington, D. C., brought to a successful conclusion their three-day Third Annual Conference on May 22, 1953, at the U. S. Hotel Thayer, West Point, N. Y. With an attendance of some 250 members and guests and 15 exhibitors from all parts of the United States and Canada, the conference was one of the best attended and most successful ever held by the Society.

The conference, which was held with the sponsorship and active participation of the U. S. Navy, U. S. Air Force and U. S. Army Signal Corps, was under the direction of the New York Chapter of the Society, with Mr. Peter Krause, President of the Chapter, as Chairman.

Beginning promptly on the morning of May 20, 1953, the conference consisted of a number of exhibitions and technical papers on such subjects as: Photographic Instrumentation, Light Sensitive Systems, Chemistry and Physics in the Photographic Process, Sensitometry and Processing, and others.

The exhibits, which were large and varied, contained many items of interest. A feature of the exhibits was the number of underwater cameras on display among which may be mentioned the 35mm underwater Leica still camera with f/2.0 lens and 1/1000 second shutter speed and f/1.9 Xenon Lens; also the Eclair Aquaflex 35mm underwater motion picture camera equipped with water fins and 400 foot magazine. The camera is pressurized and operates at a speed of 24 frames per second, variable at will.

A highlight of the conference was the installation of the following newly elected officers of the Society for two-year terms: Mr. Leo Pavelle, President; Mr. Steven Levinos, Engineering Vice President; and Mr. Lloyd Varden, Editorial Vice President.

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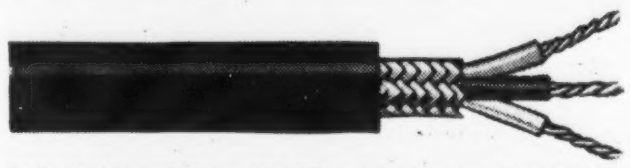
RADIO AND INSTRUMENT HOOK-UP WIRE,
Underwriters Approved, for 80° C., 90° C. and 105° C. temperature requirements. Plastic insulated, with or without braids.

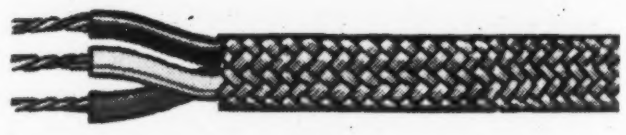


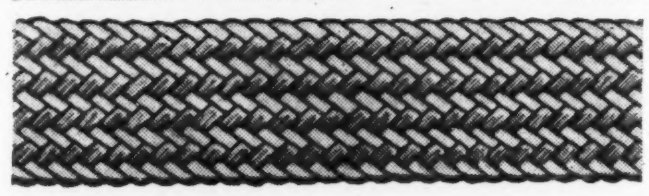
SHIELDED JACKETED MICROPHONE CABLE
Conductors: Multiple—2 to 7 or more conductors of stranded tinned copper. Insulation: extruded color-coded plastic. Closely braided tinned copper shield. Tough, durable jacket overall.

RF CIRCUIT HOOK-UP AND LEAD WIRE
for VHF and UHF, AM, FM and TV high frequency circuits. LENZ Low-Loss RF wire, solid or stranded tinned copper conductors, braided, with color-coded insulation, waxed impregnation.

JACKETED MICROPHONE CABLE
Conductors: Extra-flexible tinned copper. Polythene insulation. Shield: #36 tinned copper, closely braided, with tough durable jacket overall. Capacity per foot: 29MMF.

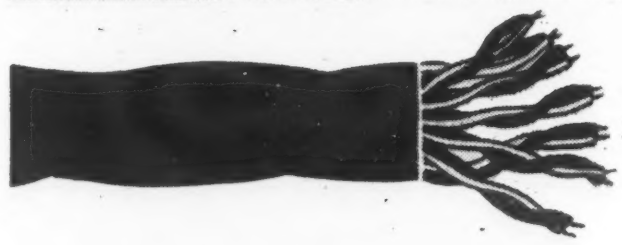
SHIELDED MULTIPLE CONDUCTOR CABLES
Conductors: Multiple—2 to 7 or more of flexible tinned copper. Insulation: extruded color-coded plastic. Closely braided tinned copper shield. For: Auto radio, indoor PA systems and sound recording equipment.





TINNED COPPER SHIELDING AND BONDING BRAIDS
Construction: #34 tinned copper braid, flattened to various widths. Bonding Braids conforming to Federal Spec. QQ-B-575 or Air Force Spec. 94-40229.

SHIELDED COTTON BRAIDED CABLES
Conductors: Multiple—2 to 7 or more of flexible tinned copper. Insulation: extruded color-coded plastic. Cable concentrically formed. Closely braided tinned copper shield plus brown overall cotton braid.



PA AND INTERCOMMUNICATION CABLE
Conductors: #22 stranded tinned copper. Insulation: textile or plastic insulated conductors. Cable formed of Twisted Pairs, color-coded. Cotton braid or plastic jacket overall. Furnished in 2, 5, 7, 13 and 25 paired, or to specific requirements.

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cords, cable and wire for radio ◆ p. a. ◆ test instruments ◆ component parts

HIGH FIDELITY SIMPLIFIED. By Harold D. Weiler. John F. Rider Publisher, Inc., 208 pages, $2.50.

High fidelity means different things to different people. To the engineer. it means a wide range of frequencies. To the layman, it means superior sound reproduction.

Mr. Weiler addresses his book to that growing multitude of people who love and appreciate good music of any kind. He says, "For various reasons, geographic and otherwise, many of you cannot manage frequent attendance at live performances of the music you like. Others of you can, but would like to augment this attendance. All of you are concerned with an alternative: the full enjoyment of this medium in your own home."

HIGH FIDELITY SIMPLIFIED contains advice and explanations that will guide the reader in creating a high fidelity system which will give the most satisfaction at the least expense.

Available with this book is a specially recorded record which enables the individual to make definitive performance tests of the audio equipment he owns. A section of HIGH FIDELITY SIMPLIFIED tells the reader what to listen for when making the tests.

For the how, what, why and where of high-fidelity systems read HIGH FIDELITY SIMPLIFIED. A book easy to read for the layman and full of helpful hints for the engineer.

TELEVISION RECEIVER DESIGN I, I. F. Stages. By A. G. W. Uitjens. Philips' Technical Library, Elsevier Press, Inc., 177 pages, $4.50.

This is the first in a series of 5 or 6 specialized monographs, entitled ELECTRONIC VALUES, which aim to supplement the existing general treatments of the subject—Television—with detailed consideration of specific problems encountered in the design and application of television receivers.

This monograph deals particularly with pentode amplifiers operating in a frequency range lying roughly between 10 Mc/s and over 100 Mc/s. The high-frequency amplifiers of T. R. F. receivers (40 Mc/s to 70 Mc/s) also come under this definition, and thus, while not strictly coming within the scope of this, the author included them for the sake of completeness.

Mr. Uitjens has done an excellent job in compiling I. F. STAGES, which is on the "must" list for television engineers and designers.

STILWELL'S MISSION TO CHINA. By Charles F. Romanus and Riley Sunderland. Office of the Chief of Military History, Department of the Army, 441 pages, $5.00.

The first of a three-volume subseries tells the history of the U. S. Army in the China - Burma - India Theater of Operations and is the fifteenth volume to be published in the series, U. S. ARMY IN WORLD WAR II. Based principally on War Department records, this volume narrates the high-level planning and policy debates over China in the 1941-1943 period. The central theme is the story of General Stilwell's efforts to improve the combat efficiency of the Chinese Army and to increase the effectiveness of U. S. Aid to China. A new light is thrown on the Stilwell story by the use of the general's personal papers, which were opened for the first time in May of 1950 and consulted by the authors.

The volume traces the origins of the prewar U. S. program of equipping thirty Chinese divisions, a 500-plane Chinese air force, and a line of communications to China from Rangoon. It describes the complicated Allied command situation that developed in China, Burma, and India, and details the First Burma Campaign, with Japanese material to give a glimpse of the other side of the story.

The cause-and-effect relationship of the Generalissimo's famous "Three Demands" to his alliance with the United States is discussed.

The volume contains much data for the student of military history. It explains Stilwell's liaison system with the Chinese Army, his proposed measures to create competent Chinese divisions, and his methods of building an effective Asian army. After describing unsuccessful attempts to have Stilwell removed from command, the volume ends with an account of Stilwell's conclusion, in October 1943, that there was nothing more he personally could do in China and his decision to leave matters to the Generalissimo and Chennault.

Besides containing much data for the scholar and the student of military history, STILWELL'S MISSION TO CHINA should also prove of great interest to the thoughtful reading public, particularly those who served in the China-Burma-India area during the last war.

THE APPROACH TO THE PHILIPPINES. By Robert Ross Smith. Office of the Chief of Military History, Department of the Army, 623 pages, $5.50.

The sixteenth in the 80-odd volume series, U. S. ARMY IN WORLD WAR II, and the third in the sub-series THE WAR IN THE PACIFIC was published on April 22nd.

THE APPROACH TO THE PHILIPPINES deals principally with the amphibious and ground operations along the New Guinea coast during 1944 and also relates the Army's part in the conquest of the southern Palau Islands, actions which opened the way for the Allied invasion of the Philippine Islands in the fall of 1944.

Although this is essentially the story of U. S. Army ground combat operations during the approach, Mr. Smith covers the activities of all ground, air, and naval forces where it is necessary in order to understand the Army ground actions.

The drive toward the Philippines comprised a series of highly complicated operations, and called for intricate and detailed plans and a high degree of coordination between ground, air, and naval forces. Each of these operations was a separate attack with its own set of plans and assigned forces. As the tempo of the war against Japan was stepped up

Robert Ross Smith, author of THE APPROACH TO THE PHILIPPINES

New and Interesting Books

THE ARMY AIR FORCES IN WORLD WAR II. Edited by Wesley F. Craven and James L. Cate. University of Chicago Press, 878 pages, $8.50.

RADIO AND TV HINTS. Edited by Martin Clifford. Gernsback Publications, Inc., 112 pages, $1.00.

STORAGE TUBE AND THEIR BASIC PRINCIPAL. By M. Kroll and B. Kazan. John Wiley & Sons, Inc., 143 pages, $3.00.

FILTER DESIGN. DATA FOR COMMUNICATION ENGINEERS. By J. H. Mole. John Wiley & Sons, Inc., 252 pages, $7.50.

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these operations followed each other so rapidly that preparations and plans for one operation were being made while one or more of the earlier operations were still in progress.

Mr. Smith has done an excellent job describing each of these operations from the inception of the plan to its execution. Because of the nature of the combat, the author's level of treatment is generally that of the regimental combat team—the infantry regiment with its supporting artillery, engineer, tank, medical, and other units.

VACUUM TUBE OSCILLATORS. By William A. Edson. John Wiley & Sons, Inc., 476 pages, $7.50.

With its level of treatment directed toward the graduate of the usual 4-year course in electrical engineering, this book should be useful as a textbook for a senior or graduate course, as well as for the guidance of practicing engineers.

The subject—vacuum tube oscillators—is vastly interrelated, but the author has excellently treated each chapter as a self-sufficient unit, so the book may serve as a useful reference work and an instructor may adjust a course to the needs of his students and the time available.

Although the author assumes that those reading this book have a knowledge regarding the characteristics of the ordinary vacuum tubes, the first five chapters are needed as a basis for the subsequent material.

In order to keep the length of this book within reason, it was necessary for the author to omit much interesting and important material, but for those who desire more details, Mr. Edson has prepared an extensive bibliography.

For those persons interested in radio, television, and radar—where at least one vacuum-tube oscillator is used in every transmitter or receiver—Mr. Edson's book with its clear and adequate exposition of the behavior of oscillators contains the answers to many problems.

DICTIONARY OF CIVICS AND GOVERNMENT. By Marjorie Tallman. The Philosophical Library, 291 Pages, $5.00.

In a time when every newspaper, radio and TV station is a constant source of political verbiage, we all notice words and phrases that seem to have a political connotation not to be found in the usual dictionary.

The place to look is THE DICTIONARY OF CIVICS AND GOVERNMENT. In this handy reference book, Miss Tallman has amassed a collection of hundreds of words and expressions fully but simply defined, valuable for a clearer understanding of the operation of our national, state and local governments. Included also are related topics extending into the field of sociology with references to population shifts, immigration and crime prevention; into economics with the inclusion of problems related to agriculture, financing and industrial relations; and briefly some high lights of foreign and international affairs having a strong bearing on the American political scene including topics on the United Nations, European conferences, and Latin American relations. Most items are illustrated by appropriate details from American history or party platforms of Congressional or municipal legislation. A rich source is provided for the study of American Democracy in action through provision of material in civil rights, academic freedom, progressive legislation and the role of labor organizaitons.

Miss Tallman's book provides an excellent opportunity to become familiar with political terminology.

THE ARMOR OF ORGANIZATION. By Alvin Brown. Hibbert Printing Co., 597 pages, $5.50.

In his newest book on organization, Mr. Brown provides a rational plan of organization for the Armed Forces and an inquiry into the origins of existing military organization. Actually Mr. Brown's work is three books in one. First, it is a historical account of the development of military organization, discussing how the concept of staff grew, and how staff became a substitute for organization. Continuing with an analysis of present military organization. Mr. Brown exposes two principal errors; the neglect to differentiate functions, and the failure to delegate responsibility. With the foregoing as a foundation, Mr. Brown shows how the principles of organization can be applied to military requirements so as to devise an effective organization for the Armed Forces.

As is only fitting for a man who has devoted himself to a study of organization, Mr. Brown's treatment of the subject is done in well organized, interesting-to-read fashion.

Read this book and see if you agree with the author that "The Nation can no longer afford to neglect 'The Armor of Organization' for its Armed Forces."

THE SUEZ CANAL IN WORLD AFFAIRS. By Hugh J. Schonfield. The Philosophical Library, 174 pages, $4.50.

In this book the acknowledged authority on the subject brings up to date the history of one of the oldest engineering enterprises considered by civilized man. He describes how ancient Egypt, Persia, and Rome all succeeded in linking the Mediterranean with the Red Sea, before it became one of the great issues of the mid-nineteenth century.

With great clarity and not without irony Mr. Schonfield traces the inner story of de Lesseps' project and triumph, and goes on to show how his ideal of an inviolable waterway dedicated to the service of man gradually became overshadowed by war and the political ambitions of the Great Powers.

The latter part of the book breaks fresh ground with an account of the role of the Canal in the Second World War, and of the clash between an Egypt stridently conscious of her freshly won sovereignty and a Britain contending to maintain the strategic interests of the Commonwealth and the North Atlantic Treaty Powers.

Mr. Schonfield, who looks at history from a detached point of view, has written a much-needed standard work. On the one hand it provides the essential detailed information on the subject; on the other hand it sheds light on, and puts in proper perspective, one of the most vexed and persistent of international problems.

Our Book Department can furnish any book currently in print. We will also help to secure older copies that you may need to complete your library. A 10% discount allowed all Association members on orders of $10 or more. Please indicate author and publisher where known and allow three weeks for procurement and delivery.

Letters TO THE EDITOR..

Credit is Due

DEAR SIR:

Received the March-April issue, and found the article, "WTE Calling," by Major McNally.

After reading the article I am somewhat appalled at the complete absence of recognition which I think is rightfully due the Transportation Corps and more specifically the Transportation Research and Development Station of Fort Eustis, Virginia. Surely, the railway people aren't such "menaces" as stated in the article. Let me give you a short run down on the part the TC played in providing the President a communications car.

Originally the TC was assigned the responsibility of determining the structural and interior design, the trucks, the air brakes, the running gear equipment and other features that required modifications. Incidentally, the basic car was a WW II Hospital Car and came out of a TC storage depot.

The problem was a difficult one in view of the fact the weights, sizes and types of equipment to go in the car were not always definitely known.

Several conferences were held with the Signal Corps in Washington, and later a TRADS contract was signed with the St. Louis Car Company. During the modification of the car the TRADS Project Engineer maintained a very close contact with the situation as various changes were made in position and types of communication equipment within the car. Again those "menaces" had to be certain the structure, running gear, axles, etc., were adequate.

Specifically, the Transportation Corps contributed the following:

a. Maintained the proper clearances of the completed car.
b. Determined proper axle sizes and arranged for roller bearings.
c. Arranged for the air conditioning system which was a very complex installation.
d. Engineered the reinforcements to underframe and superstructure.
e. Rearranged the lighting system.
f. Maintained close supervision with the reconstruction so that the car would be capable of complete interchange with all railroads.

Those of us in TRADS and the TC are proud of those TC people who assisted so much in providing the President a superior communications car. We would just like to have a little recognition and so I wanted to put in two cents worth for the TC.

MAJOR THEODORE G. MOLINE, TC
Fort Eustis, Virginia

(Ed. This letter was brought to Col. McNally's attention. He said that many details had been omitted from the article, not with the intention of discrediting anyone, particularly not the Transportation Corps, but with the idea to make the story a light and "breezy" feature about the Communications Car.)

Photo Issue Clicks

TO THE EDITOR:

Let me congratulate you and your staff on the May-June issue of SIGNAL. I thought it was extremely well done, and one that all of your office staff should be mighty proud of.

There is one article that I am personally interested in with regard to the mobile television unit built here in Burbank. in which I had a hand indirectly.

L. C. SIGMON
President, Station KMPC
Los Angeles

DEAR SIR:

I am in receipt of my copy of the May-June 1953 issue of SIGNAL, and hasten to express to you my appreciation of the outstanding contribution which has been made in this issue to the wider understanding of the part which photography plays in the broad field of communications.

This concept has been so well expressed in the article by your photo editor, under the title "Wedding of the Waves." Wally Watts, in his letter on page 64, also emphasized the importance of this understanding to all who work in the communications-electronics-photography field.

In fact, I found deep interest in each of the fine articles in this issue, covering as they do the wide scope of military applications of photography.

CHARLES S. STODTER
Colonel, Signal Corps
Chief, Army Pictorial
Service Division

TO THE EDITOR:

The photographic issue was a dandy. I enjoyed reading it from cover to cover.

JOSEPH C. WILSON
President, The Haloid Company
Rochester, N. Y.

DEAR SIR:

General Day is very pleased with your presentation of the material which we provided, and we wish to thank you for this opportunity of making known Air Force efforts in the television field.

CAPT. SAMMY A. WEST
Chief, Information Services Division
APCS-MATS, Orlando AFB

DEAR EDITOR:

The Graflex story looks fine and we are very much pleased to be in such distinguished company.

E. M. K. MURRAY

DEAR SIR:

It looks swell! I like the layout and all the rest inside—in fact, I'll be taking it home to read it all.

E. F. RICHNER
Eastman Kodak
Rochester, N. Y.

TO THE EDITOR:

I can not tell you how pleased we are with the treatment you gave the Microfilm article.

DEAN A. KEARCH
Remington Rand Inc.

DEAR SIR:

I certainly want to congratulate you on the appearance of the May-June issue. The subject matter is extremely interesting.

HOWLAND PIKE
Ansco Division
General Aniline & Film Corp.

Constructive Suggestion

I'm sure glad to get some stuff on photography in SIGNAL. Up to now I have seen very little. Our bimonthly dinner seems to consist of all meat and no potatoes, by that I mean an emphasis on radio, electronics or photography in any one issue and not sections in each issue for the separate spheres. Would this be practical in your present setup?

WILLIAM B. COOK
Punta Gorda, Florida

(Ed. We have established a policy to balance the articles in the feature section of each issue of the magazine among the three fields of interest of the Association.)

Convention

I have heard a number of comments regarding your convention more or less to the effect that—in relation to the IRE Convention on Airborne Electronics—what it lacked in size, it made up in vigor!

JAMES L. DENNIS
Dayton, Ohio

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On The Move

When you change your address, please notify our Circulation Department immediately so that we can keep our records up to date and follow you with SIGNAL and the NEWSLETTER.

ARMED FORCES COMMUNICATIONS ASSOCIATION

(COMMUNICATIONS—ELECTRONICS—PHOTOGRAPHY)

1624 Eye Street, N.W.
Washington 6, D. C.

CONSTITUTION and BY-LAWS

Adopted April 29, 1947

Revised

May 11, 1948
March 28, 1949
May 12, 1950
April 19, 1951
April 24, 1952
May 15, 1953

For the information of our members there is published here our Association's Constitution and By-Laws to include latest revisions made at the 1953 Annual Meeting, May 15, at Dayton, Ohio.

PREAMBLE

The Armed Forces Communications Association, organized in 1946 and incorporated under the laws of the District of Columbia, is a national society of American citizens working toward national security in the fields of communications, electronics and photography.

The Association endeavors to maintain and improve the cooperation between the Armed Forces and Industry in communications, and in the design, production, maintenance and operation of communications, electronics and photographic equipment in time of peace as well as in time of war.

The principal objective of the Association is an active membership of American citizens to whom the responsibility of training, production, maintenance and operation of this type of equipment falls in time of peace as well as in time of war.

The Association is entirely patriotic and non-sectarian; it has no commercial interests and no political alliances. It is not operated for profit and its income is expended in furthering its aims and purposes. Its elected officers serve without remuneration. All American citizens are eligible to membership.

SIGNAL, the journal of the Association, is published for the purpose of disseminating chapter news and other information of interest and importance to the members.

ARTICLE I

NAME AND LOCATION

Sec. 1. The name of the Association shall be the Armed Forces Communications Association.

Sec. 2. The executive offices of the Association shall be in the City of Washington, District of Columbia.

ARTICLE II

MEMBERSHIP

Sec. 1. Membership in the Association shall be open to American industrial organizations and to all men and women who are American citizens and who are interested in furthering the objectives of the Association, with honorary and associate memberships offered to certain citizens of foreign countries.

ARTICLE III

GOVERNMENT AND OFFICERS

Sec. 1. The government of the Association shall be vested in the Board of Directors, which may exercise all powers and do all such things as may be exercised or done by the Association, but subject, nevertheless, to the provisions of the statutes of the District of Columbia, the Certificate of Incorporation of the Association, and the Constitution and By-laws of the Association.

Sec. 2. The Board of Directors shall consist of 32 members, elected by the Council, each to serve without pay for a term of four years, and divided into four classes of eight members each, one class to retire at the end of the annual meeting each year, or upon the election and qualification of their successors. The Board of Directors shall have the power to fill casual vacancies in its membership and in all national offices of the Association, and to initiate executive measures necessary to achieve the objectives of the Association. The Board shall meet at least once each year, at the same time and place as the annual convention of the Association.

Sec. 3. The officers shall consist of a president, an executive vice president, a first vice president, a second vice president, and such additional number of vice presidents, not to exceed three, as may be authorized by the Board of Directors, a secretary, and a treasurer. With the exception of the executive vice president, secretary, and treasurer, the officers shall serve without pay. All officers (with the exception of the Executive Vice President, the Secretary, and the Treasurer) shall be elected by the Board of Directors at its annual meeting, from the active membership of the Board, to take office at the end of the annual meeting at which they are elected, and to serve for a term of one year following their election, or until their successors are elected and qualify.

Sec. 4. The Board of Directors shall at its annual meeting elect a Counsel to serve without pay for a term of one year beginning at the end of the meeting at which he is elected, or until his successor is elected and qualifies.

Sec. 5. The Board of Directors shall at its annual meeting appoint an Executive Vice President, a Secretary, and a Treasurer, each to serve for a term of one year beginning at the end of the meeting at which he is appointed, or until his successor is appointed and qualifies, and shall fix the annual salary for such period. The offices of Executive Vice President, Secretary and Treasurer may be held by one person, who need not be a director of the Association.

Sec. 6. Regular Service personnel shall not be eligible to hold a paid national office in the Association while on active duty status.

Sec. 7. The Council of the Association shall consist of the members of the Board of Directors and one representative for each 100 members or fraction thereof in each chapter, provided however that no chapter shall have less than two chapter representatives, elected or appointed by the chapter for a period of one year beginning on April 1st of each year. The national president of the Association, or in his absence the senior vice president present, shall serve as Council chairman.

The functions of the Council shall be to elect the Board of Directors and Honorary Members, and to make recommendations with reference to any proposed amendments to the Constitution. Chapters shall have power to fill unexpired terms of their Council representatives. The Council shall meet once each year at the time and place of the annual convention of the Association and at the hour designated by the Executive Committee. A majority vote of the members of the Council present shall be necessary for election to the Board of Directors. Members of the Council are eligible to be present at the annual meeting of the Board of Directors and to participate in the discussions, but shall not have the power to vote.

Sec. 8. There shall be an Executive Committee which shall consist of the President, the immediate Past President, and seven other members of the Board, to be elected by the Board of Directors at its annual meeting for a term of one year beginning at the end of the annual meeting at which they are elected. The Counsel and Executive Vice President shall be eligible to attend meetings of the Committee, but shall have no vote unless they have been elected members of the Executive Committee.

The Executive Committee shall meet at least once each quarter, and at the call of the President or of any three of its members. It shall exercise the powers set forth in the Constitution and By-Laws, also the powers of the Board of Directors between meetings of that Board. All actions taken by the Executive Committee shall be ratified by the Board of Directors at its next subsequent meeting. The Executive Committee shall have the power to fill vacancies for unexpired terms. Notice in writing of the time and place of each meeting of the Executive Committe shall be sent to all members of the Committee at least ten (10) days prior to the meeting date.

Sec. 9. Special meetings of the Board of Directors may be called by the President, the Executive Committee, or any three members of the Board of Directors. Notices of such meetings shall be in writing and shall state the time and place of the meeting, and shall be sent to all Directors at least ten (10) days prior to the meeting date.

Sec. 10. Qualification of Directors and others shall be by acceptance within thirty (30) days by the Director or other persons elected or appointed.

Sec. 11. A quorum of the Council shall consist of 11 members; of the Board of Directors, 9 members; and of the Executive Committee, 3 members.

ARTICLE IV

MEETINGS

Sec. 1. The Association shall hold an annual meeting in the spring of the year at a time and place to be designated by the Executive Committee, which will cause to be prepared a program to include, where possible, the demonstration of such military and industrial communications, electronic and photographic equipment and training as may be authorized.

Sec. 2. The Association may hold such special meetings as may be called by the President or the Board of Directors or the Executive Committee.

ARTICLE V

CORPORATE OBLIGATIONS

Sec. 1. No obligation shall be incurred on behalf of the Association except by the Executive Vice President or by his written authorization and then only to the extent of funds in the Treasury available to meet the obligation. All obligations incurred by the Corporation shall be solely corporate obligations and no personal liability whatsoever shall attach to, or be incurred by, any member, officer or director of the Corporation by reason of any such corporate obligation.

ARTICLE VI

AMENDMENTS

Sec. 1. Amendments to this Constitution may be proposed by a majority vote of the Board of Directors or of the Executive Committee or upon petition addressed to the President and signed by not less than five percent of the total number of full members.

Sec. 2. Proposed amendments shall be submitted to the Council at any annual or special meeting for discussion and recommendations after which they shall be referred for final action to the Board of Directors, which may adopt them by a majority vote of the Directors present at any duly convened annual or special meeting at which a quorum is present.

BY-LAWS

1. AIMS AND PURPOSES

a. To preserve and foster the spirit of fellowship among former, present and future communications, electronics and photography personnel of Industry and the Armed Forces.

b. To commemorate the services rendered by the communication, electronic and photographic industries and of industrial personnel, and by the military personnel assigned to these activities in the wars in which the United States has been or may become engaged.

c. To promote efficiency in military communications, electronics and photography, especially through better liaison between Industry and the Armed Forces, as well as among the three Services themselves. This will include the maintenance of close relations between civilian scientists, engineers, manufacturers and operating companies and those concerned with similar activities in military, naval and air force communications, electronics and photography.

d. To bring to the attention of the membership through chapter meetings and the Association magazine, the importance of thorough cooperation between Industry and the Armed Forces in the communications, electronics and photographic fields.

e. To encourage adequate military training throughout the Nation, the upbuilding of adequate enlisted, and commissioned National Guard and Reserve forces, and effective industrial preparedness for war, in the fields of communications, electronics and photography.

2. CLASSES OF MEMBERSHIP

a FULL MEMBERSHIP in the Association shall be open to all American citizens interested in advancing the aims of the Association—especially in communication, electronic and photographic phases thereof. Present and former military personnel and civilians employed in the electronic, photographic and communication industries, will be especially encouraged to become full members.

b. LIFE MEMBERSHIP in the Association shall be open to all men and women who are American citizens and who are interested in promoting the objectives of the Association. Life membership shall continue during the lifetime of the life member and shall expire at his death. It shall not be transferable.

c. STUDENT MEMBERSHIP in the Association shall be open to all men and women who are American citizens and who are students in the service academies and schools, and in civilian colleges and universities.

d. GROUP MEMBERSHIP in the Association shall be open to all firms and companies controlled by American citizens who are interested in promoting the cause of industrial preparedness particularly in connection with communications, electronics and photography, and with research, development, production, manufacture, operation, and supply of communication, electronic and photographic equipment. Group members shall have the privilege of naming ten of their employees or officials who are Ameri-

can citizens for full membership in the Association, and members thus named shall pay no individual dues.

e. HONORARY MEMBERSHIP in the Association may be proposed by at least three full or life members of the Association and a favorable vote by a majority of the Council voting shall be necessary for election.

Honorary Life membership shall be extended to all former Chief Signal Officers of the Army and Directors of Naval, Air, and Coast Guard Communications, and the Defense Department Directors of Communications, and shall be extended to the active officers in these positions as soon as they assume office.

Honorary membership shall be extended to the Chairman of the Joint Chiefs of Staff and to the Chiefs of Staff of the several Services during their tenure of office, and to such other public officials as the Executive Committee may direct.

Honorary members shall be entitled to all privileges of full membership except as otherwise provided in the Constitution and in these By-laws.

f. ASSOCIATE MEMBERSHIP in the Association shall be open to all men and women who are citizens of those foreign countries where there are officially chartered chapters of the AFCA and who are recommended by any such local chapter. They shall pay the same dues as full members of the Association, and shall be entitled to all privileges of full membership except the right to vote or to hold office, or to attend meetings at which classified information is to be discussed or classified material displayed.

3. MEMBERSHIP INFORMATION—GENERAL

a. The term "members" except where specifically stated otherwise in the Constitution and in these By-laws shall mean full and life members only. Only these may vote or hold office.

b. The election to membership of all classes shall be by action of the Executive Committee, and the decision of that Committee as to eligibility shall be final.

c. Any person desiring to become a member shall make written application to the Executive Vice President. Said application shall be in such form and contain such data as may be prescribed by the Executive Vice President or the Membership Committee, in either case subject to the subsequent approval by the Executive Committee.

d. Any member may withdraw from the Association at any time by tendering his resignation in writing, but such resignation shall not become effective until said member shall have paid all obligations due the Association from him at the time of such resignation.

e. Any member may be dropped for cause by the vote of three members of the Executive Committee or, having been dropped, may be reinstated at the discretion of the Executive Committee.

f. All members are entitled to receive one copy each the Association publications.

4. MEMBERSHIP DUES

a. The fee for life membership in the Association shall be one hundred dollars ($100.00) except for students in technical schools and the U. S. Military, Naval and Coast Guard academies for which the fee will be fifty dollars ($50.00).
For *full members*, five dollars $5.00).
For *student members*, two dollars ($2.00).
For *group members*, two hundred dollars ($200.00), except for small business firms (with 500 or fewer employers) for which the annual dues are one hundred dollars ($100.00).

5. OFFICERS

a. The President shall have general supervision of the affairs of the Association and shall perform the duties usual to his office. He shall preside at the meetings of the Council, of the Board of Directors, and of the Executive Committee. He shall be *ex officio* a member of all committees and of all subcommittees thereof. In the absence of the President his duties shall devolve upon the Vice Presidents in order of seniority.

b. The First Vice President shall have general charge of memberships and the activities of local chapters.

c. The Second Vice President shall have general charge of the activities of the National Advisory Committees.

d. The Counsel shall be the legal advisor to the Executive Vice President, the National Officers, the Executive Committee, and the Board of Directors.

e. The Treasurer shall be the custodian of the funds of the Association under the direction of the Executive Committee. He shall render an annual report and such special reports as may be called for by the Executive Committee. The accounts of the Association shall be audited annually by independent auditors. However, in the discretion of the Executive Committee, a certified public accountant designated by it may conduct the annual audit, his report to be made to the Executive Committee.

f. The Executive Vice President shall make collections and disbursements under the supervision of the Executive Committee; shall keep the roster of the members and the records of the status of annual dues; shall be the keeper of the seal of the Association; and shall have the custody of correspondence and records. He shall be responsible that suitable arrangements are made for the annual and other meetings of the Association, of the Council, of the Board of Directors, and of the Executive Committee, the proceedings of which he shall record. He shall submit an annual report to the Board of Directors at its annual meeting, and a quarterly report at the specified quarterly meetings of the Executive Committee. He shall be an *ex-officio* member of all national committees but without the right to vote.

The Executive Vice President shall be responsible for hiring and discharging the necessary National Headquarters personnel and for the management of the Executive Offices and shall have the power to contract in the name of the Association for such services and supplies as are necessary for its operation. He shall have administrative charge of the activities and national programs of the Association, of the Association's magazine SIGNAL, and of all other Association publications.

g. The Secretary shall render the Executive Vice President such assistance as he may require and under the direction of the Executive Vice President perform such other duties as apertain to his office.

6. FISCAL YEAR

a. The fiscal year shall close on March 31, 1951 and on March 31 of each year thereafter.

7. CHAPTERS

a. Upon petition stating that not less than twenty-five (25) members of the Association in any locality desire to form a local chapter for the more intimate achievement of the purposes of the Association, the Executive Vice President of the Association shall immediately authorize a meeting for such inauguration, and assist in every way possible toward the organization of such chapter.

b. Upon the formation of a new chapter, the Association will issue a suitable charter, signed by the National President and the Executive Vice President of the Association.

c. Every member of the Association, unless he desires otherwise, will automatically become a member of the local chapter of the territory in which he resides, but no person shall be a member of a local chapter who is not a member of the Association.

The local chapter may collect annually all dues, both original and renewal, for all of its individual and group members. The sum of $5.00 for each full member may be sent to National Headquarters, $1.00 of which will later be returned to the chapter. Or the sum of $1.00 may be withheld by the chapter for each full member and the remaining $4.00 remitted with the application form submitted by the member.

The annual group membership fee of $200.00 ($100.00 in case of small business), either original or renewal, shall be remitted to National Headquarters, and $50.00 ($10.00 in the case of small business) shall be distributed quarterly by National Headquarters to chapters, on a pro rata basis of paid membership at the end of the quarter previous to that in which the payment is made.

d. The constitution and by-laws of each local chapter shall be in the general form of that of the Association and shall be submitted to the Executive Vice President of the Association for review and shall be approved by him before becoming effective.

e. It shall be the general purpose of the chapters of the Association to bring their individual and group members into a closer fellowship with each other and with the communication, electronic and photographic personnel of the Armed Services. This can be accomplished through the medium of chapter meetings, visits to military establishments, industrial plants and laboratories, and through seminars and discussions consistent with the national policies and objectives of the Association.

f. Sub-chapters or posts may be organized by chapters of the Association. Such sub-chapters or posts will be chartered by the parent chapter with an initial membership of at least five members of the Association in good standing. All applications and dues of such members will continue to be handled by the National Headquarters.

g. Student chapters may be organized at any college or university in the United States which carries electronics or communications courses in its curriculum.

A minimum of 10 student members may file petition for a student chapter. This charter will be issued by National Headquarters in accordance with Sec. b of this By-law.

8. RESTRICTIONS

a. No member of the military establishment of the Army, Navy, Air Force, or Coast Guard shall be employed by the Association in a paid capacity, except that articles written for publication may be paid for with the approval of the Executive Vice President.

9. NOMINATIONS AND ELECTIONS

a. On or before March 1st each year the President shall appoint a nominating committee, composed of not less than three nor more than five members of the Association. This committee shall draw up a slate of nominations for members of the Board of Directors to fill the vacancies which will occur in that year. On or about March 1st the Executive Vice President shall notify all Directors and Council representatives that nominations for new Directors are in order and shall request that the Council members submit to the chairman of the nominating committee such names as they desire to nominate for the Director vacancies to be filled.

Any group of twenty or more members in good standing of the Association may submit to the chairman of the nominating committee the name of a candidate or list of candidates, for membership on the Board of Directors. Such a petition shall be in the hands of the nominating committee at least four weeks before the annual meeting. If any person or persons so proposed is not included by the nominating committee in its list of nominations, then any member of that group proposing such person or persons may place his or their names in nomination before the Council at the same time as the names of those nominated by the nominating committee. No other person shall be voted upon or elegible for election as a director. Those candidates receiving the highest number of votes shall be declared elected.

After the nominees are selected and after ascertaining if the proposed candidates will accept the posts indicated, the chairman of the nominating committee will submit the list of candidates for directors, at the annual meeting of the Council for appropriate action.

The officers of the Association will then be elected by the Board of Directors at their annual meeting. A majority of the Directors present shall be necessary for the election of any officers or member of the Executive Committee.

10. AMENDMENTS

a. The Board of Directors shall have the power to adopt and amend the By-laws by a majority vote of those present at any annual or special meeting of the Board at which a quorum is present.

11. INSIGNIA

a. The insignia or emblem of the Association shall consist of:

1. The central figure is an alert powerful American eagle with strong talons clutching lightning flashes—symbolic of a strong America insofar as national defense and especially modern communications are concerned—our basic reason for existence. The border consists of leaves of the olive branch of peace showing that the object of military preparedness in America is to assure a lasting peace. In the background are signal flags—the first means of signaling in the U. S. Signal Corps and a method still used for special purposes by the Navy. Just above the eagle and between his outstretched wings, is a heavy bomber in flight, symbolizing the complicated and essential communication in the Air Force, Marine and Naval aviation, both intra- and inter-aircraft, air-ground and on the ground. Above that is a radar antenna array and at the very top a radio-relay antenna—for the latest major step in military communications. In the color version there are the traditional colors of the signal flags—dexter white flag with red center and sinister red flag with white center —with a gold border to the whole.

2. Insignia in this form with ribbon and modifications of it in the form of pins, badges, buttons and rings, shall be authorized by the Board of Directors for use of members. The ribbon shall be of three stripes of equal width, of dark blue, orange, and light blue—total width to be 1⅜ inches.

b. The flag of the Association shall be the above insignia superimposed upon a field of sky blue cloth —representing the medium through which modern signals are transmitted. Under the insignia shall be a scroll on which shall be inscribed "National Security through Military Preparedness."

12. NATIONAL ADVISORY COMMITTEES

a. Members of the Association shall be eligible for membership on National Advisory Committees devoted primarily to the problems of the Armed Services and to the advancement of knowledge, engineering practices and production and design techniques relating to the special fields of communications, electronics or photography and to activities of the Association.

b. These committees shall be organized in conformity with conditions in each particular field rather than according to any standard pattern.

c. Each committee shall have a chairman selected by the President of the Association and approved by the Executive Committee. The other members shall be designated by the chairman. Through meetings, conferences and discussions and in cooperation with local chapters, they shall keep the membership in close contact with progress and developments in their specific fields. They shall meet as committees from time to time to initiate recommendations or reports and shall be available in an advisory capacity on such matters as may be presented for their study and report by the Armed Forces or the Association.

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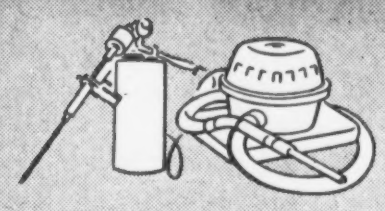

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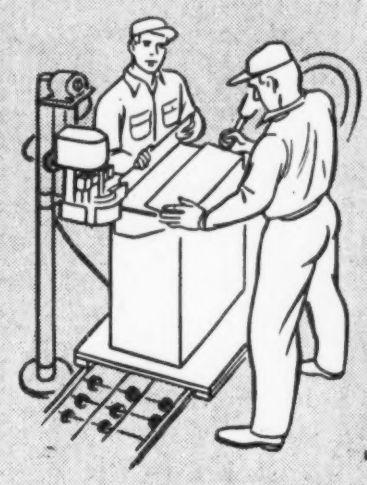

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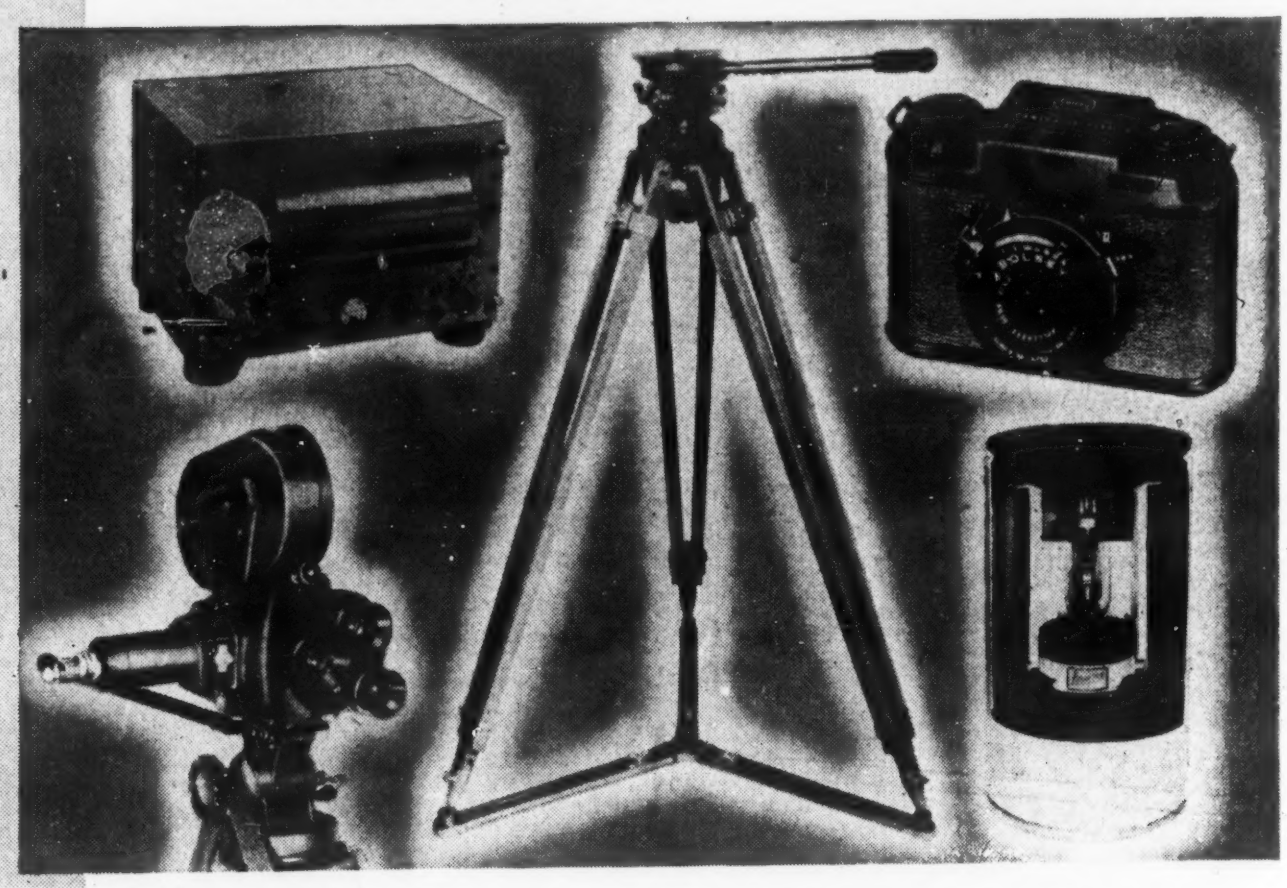

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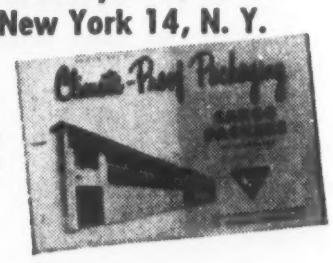

Marine Corps Electronics

(*Continued from page* 14)

demand control point for electronic maintenance parts.

Within the Electronics Supply Section, Supply Department, Washington, is a Technical group. This group is charged with electronic engineering within and for the Marine Corps, after development in accordance with approved military characteristics. Through this group the Electronics Supply Section exercises direction of depot repair shops where some adaption of other services' equipment for amphibious employment by landing forces is accomplished if necessary. It is also the electronic engineering contact point between the Marine Corps and Charleston Naval Shipyard, other government electronic agencies and commercial concerns. This Technical group is the natural point to reflect design changes believed necessary to meet Marines' needs. It is the one agency which may speak authoritatively for the Marine Corps on electronic engineering matters once procurement has been initiated.

At this point it should be remembered that electronics in the Marine Corps has as its chief functions the supply and maintenance of electronics and communication equipment and the operation of electronic equipment for purposes other than operational communications, such as missile guidance and close air support. Within the Marine Corps Supply Department, whose head is the Quartermaster General, electronics supply procures, stores, issues, repairs, rebuilds, modernizes and adapts to landing force needs all electronic and communication equipment for the Marine Corps.

The organization to effect procurement, supply and operation is functional. In fact, the Marine Corps itself is an integrated, functional organization, which although pointed toward a specific mission, may well be a pattern for unification.

Within the Corps, electronics exists to serve Marines, just as the Corps exists to serve the Nation.

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"I Remember . . ."

(*Continued from page* 35)

Amundsen made a trip to Antarctica a year or so later, and I was fortunate enough to hear and confirm his first attempt to communicate with AAA, Sydney, Australia. He reached a ship at sea, the (AAU) S.S. *Ulimaoa* with operator C. C. King. There was a second communication that got through to the (AAW) S.S. *Wimmera* operator, Flynn, and my log was used to determine which should receive the coveted £100 ($500.00 U. S. currency) for first contact with Amundsen. Amundsen's rig had suffered from a dunking and required several months to recondition before use at full power.

The steamships rounded the ports of New Zealand only weekly, and the harbor of Dunedin was often blocked for hours at the sand bar, and ships often were delayed to such an extent that the boats docked at Port Chalmers about 20 miles down the bay to save time. It was my pleasure as a "ham" to talk with all the ships before entering the harbor and pass the word to port authorities.

His Majesty's ships, and I remember one in particular, HMS *Pioneer*, carried Marconi spark equipment in those early days, and had very little opportunity of ship to shore communications or ship to ship (Navy) on account of absence of land stations and great distance to other Royal Navy ships, so they welcomed any chance to get in touch with anybody while at sea, and while on land they always found a good meal and a pleasant evening—or even a bed—at one of the S, H & B gang.

As a matter of history, C. S. Hicks became the Director of the College of Surgeons at Adelaide, South Australia. Cyril Brandon's address is unknown. Without the help and encouragement of Mr. George H. Hicks, yours truly and the gang would probably not have been able to make the demonstrations, and E. E. Stark contributed encouragement and the salvage materials used by the gang. We salute our dads.

In this age of wonderful developmental progress we all enjoy, it is with great pride that I can say "I am an American."

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Automatic Teletypewriting Switching System

(*Continued from page* 39)

ing teletypewriter information from the message tape is shown in Figure 4.

When the tape reader mainshaft revolves, spring-loaded pins mechanically sense for perforations in the message tape. Each perforation allows the proper pin to project through the tape, causing ground to appear on its associated contact. Ground is extended from each contact to a battery-connected sensing relay which operates, actuating the relay contacts.

Assume that the letter Z is encountered by the tape reader. Since the teletypewriter code for Z produces perforations in No. 1 and No. 5 positions, ground appears on leads No. 1 and No. 5 during the reading cycle, operating relays A and E. Now,

(*Continued on page* 80)

Electronic Equipment Reliability

(*Continued from page* 24)

2. The formulating of plans to educate design and project engineers in industry and Government so that reliability can be designed into the equipment: and
3. The cooperation with Government agencies and industry alike in the implementation of this and all other plans for the improvement in the reliability of electronic equipment.

That the actions of the two groups will be coordinated is assured by the fact that the same person is chairman of both groups.

In summary, the Services are improving their general specifications for the procurement of electron tubes, parts and equipment, and improving methods and techniques for their manufacture/and inspection. We have established procedures which keep us informed of the areas where troubles may arise and are providing the means for analyzing and overcoming these difficulties. The actions initiated to date have only scratched the surface. Since the over-all problem is one of life or death, it behooves us to accelerate the progress. If we are to achieve our goals in the shortest time possible, it is essential that the engineering forces of all segments of the electronic industry give us their wholehearted support and assistance. No single individual or group of individuals has all of the "know-how" or all of the answers to the wide variety of problems which exist. It will only be through the complete cooperative efforts of the Department of Defense and private industry that we will be able to win our objective—that of supplying our combat forces, rapidly and in the quantities required, with the most reliable electronic equipment humanly possible to produce.

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Enlarged photo shows the transistor before and after being encased in its plastic shell. Inset, Transistor actual size.

Transistor_ mighty mite of electronics

Increasingly you hear of a new electronic device—*the transistor.* Because of growing interest, RCA—a pioneer in transistor development for practical use in electronics—answers some basic questions:

Q: ***What is a transistor?***

A: The transistor consists of a particle of the metal germanium imbedded in a plastic shell about the size of a kernel of corn. It controls electrons in solids in much the same way that the electron tube handles electrons in a vacuum. But transistors are not interchangeable with tubes in the sense that a tube can be removed from a radio or television set and a transistor substituted. New circuits as well as new components are needed.

Q: ***What is germanium?***

A: Germanium is a metal midway between gold and platinum in cost, but a penny or two will buy the amount needed for one transistor. Germanium is one of the basic elements found in coal and certain ores. When painstakingly prepared, it has unusual electrical characteristics which enable a transistor to detect, amplify and oscillate as does an electron tube.

Q: ***What are the advantages of transistors in electronic instruments?***

A: They have no heated filament, require no warm-up, and use little power. They are rugged, shock-resistant and unaffected by dampness. They have long life. These qualities offer great opportunities for the miniaturization, simplification, and refinement of many types of electronic equipment.

Q: ***What is the present status of transistors?***

A: There are a number of types, most still in development. RCA has demonstrated to 200 electronics firms—plus Armed Forces representatives—how transistors could be used in many different applications.

Q: ***How widely will the transistor be used in the future?***

A: To indicate the range of future applications, RCA scientists have demonstrated *experimental* transistorized amplifiers, phonographs, radio receivers (AM, FM, and automobile), tiny transmitters, electronic computers and a number of television circuits. Because of its physical characteristics, the transistors qualify for use in lightweight, portable instruments.

* * *

RCA scientists, research men and engineers, aided by increased laboratory facilities, have intensified their work in the field of transistors. The multiplicity of new applications in both military and commercial fields is being studied. Already the transistor gives evidence that it will greatly extend the base of the electronics art into many new fields of science, commerce and industry. Such pioneering assures finer performance from any product or service trademarked RCA and RCA Victor.

RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT **CAMDEN, N.J.**

Automatic Teletypewriting Switching System

(*Continued from page* 78)

ground will appear on lead Z through make contacts on operated relay A, break contacts on no-operated relays B, C and D, and make contacts on operated relay E. Ground will not appear on lead X since that lead extends through make contact on relays C and D which are not operated. Note also that ground will not appear on lead Z during the reading of any character other than Z. The letter X, for example (code 1, 3, 4 and 5) will open lead Z at break contacts on relays C and D.

Lead X will bear ground only when the teletypewriter code for X is detected by the tape reader. Similarly, by properly connecting other make and break contacts on the sensing relays, any teletypewriter character can be detected and decoded into a single ground.

A multitude of similarly simple circuits makes up the bulk of the equipment of Teletypewriter Switching Center AN/GGC-2(XC-1).

The Hammarlund Story

(*Continued from page* 17)

immediately after its appearance on the market, is today in use by governmental, military, and commercial groups all over the world and is the pride of all the company's products.

Company Leadership

The company officials at present include Lloyd A. Hammarlund, president; Joseph Lush, vice president and treasurer; E. A. Wittmer, comptroller; Hugh A. McCloskey, plant manager; Robert B. Moon, general sales manager; and S. H. Van Wambeck, chief engineer. It is with the leadership of these persons that the company maintains its fine position in the electronic field.

In the shops are Joseph Klein, supervisor of the model shop; George Froelich, superintendent in receiver manufacturing; and Robert Schott, superintendent of component assembly—all of whom have been with the company from 25 to 30 years and who gave generous help in developing this material.

All photos are official Army or Navy photographs, unless otherwise indicated, or are the property of the companies in whose articles they appear.

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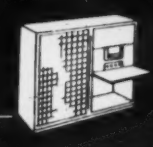

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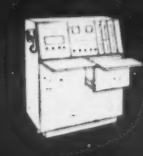

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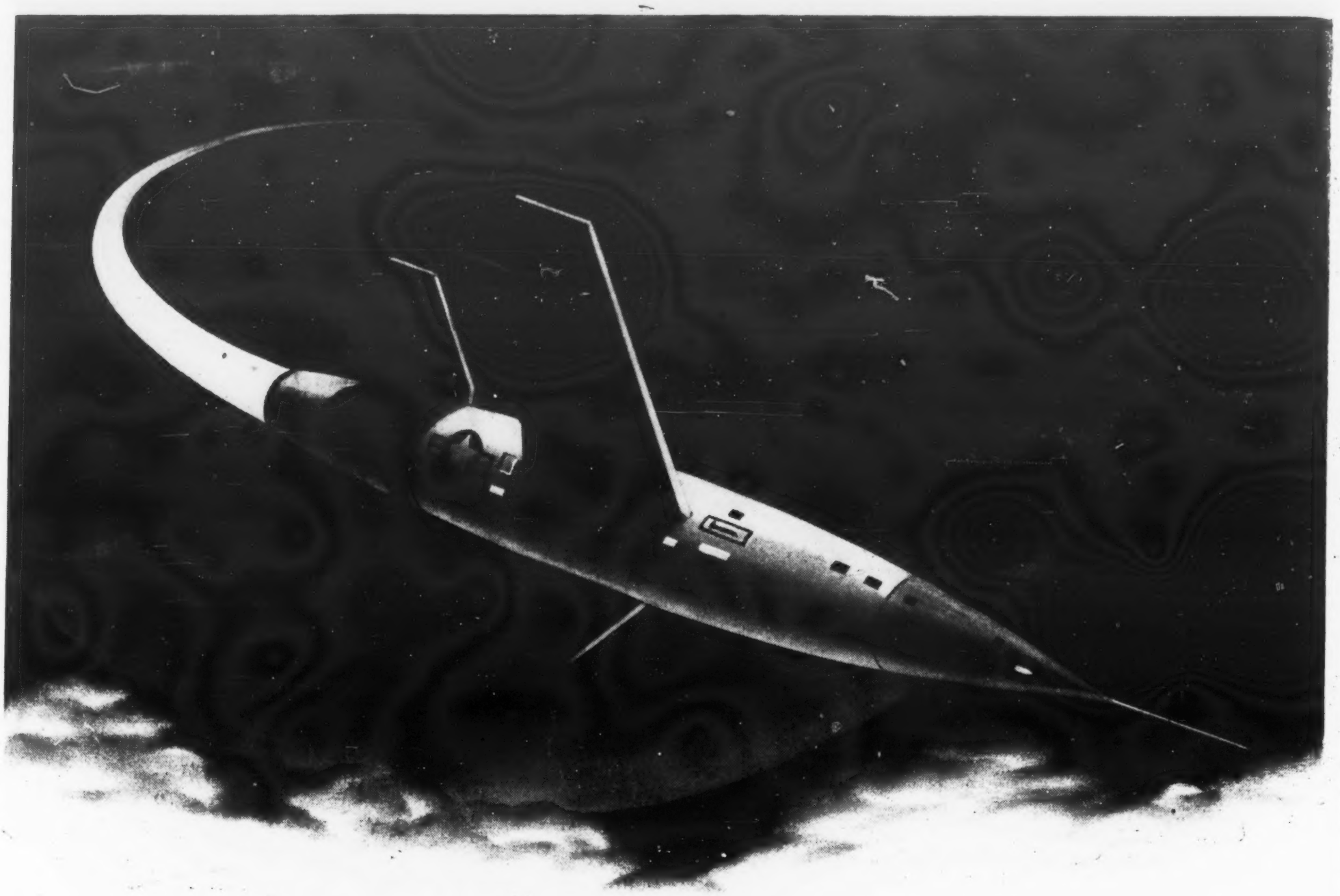

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Complete *reliability* on electronics equipment is based upon precision of design, manufacture, inspection and test methods.

Defense projects in electronics at Du Kane Corporation are fulfilled with meticulous design and assembly procedures, up-to-the-minute facilities and manufacturing techniques, followed by close inspection and rugged testing. Our excellent record for high quality maintained throughout many years of commercial electronics production, enables Du Kane to meet exacting standards.

Should your service have a classified project—if your prime contractor has a project where electronics *reliability* is the major factor, take advantage of Du Kane's thirty years of experience and discuss details with our technical staff.

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